Environmental Assessment

Natural Gas Pipeline Projects in Northeastern Wisconsin Related to A Proposed Extension of the Guardian Pipeline

Wisconsin Gas LLC
Wisconsin Electric Power Company
Wisconsin Public Service Corporation

Public Service Commission of Wisconsin Dockets
5-CG-103, 6650-CG-220, and 6690-CG-160

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PURPOSE OF THIS DOCUMENT

This Environmental Assessment (EA) has been prepared as part of the Public Service Commission of Wisconsin's (PSC) obligations under the Wisconsin Environmental Policy Act (WEPA, Section 1.11, Wisconsin Statutes and Chapter PSC 4, Wisconsin Administrative Code). The EA will be used to determine whether the natural gas pipeline laterals proposed by Wisconsin Gas LLC (WG), Wisconsin Electric Power Company (WEPCO) and Wisconsin Public Service Corporation (WPSC) require the preparation of an environmental impact statement (EIS) by the PSC.

This EA also includes some general discussion of a related interstate pipeline system expansion by Guardian Pipeline LLC. Guardian's proposed pipeline is necessary in order for the WG, WEPCO and WPSC lateral pipeline projects to function, but the PSC has no jurisdiction over the Guardian project. Guardian's proposal is subject to certification by the Federal Energy Regulatory Commission (FERC). FERC is preparing a federal EIS on Guardian's proposal. The discussions of Guardian in this EA are intended to recognize the relationship of the laterals to the proposed interstate pipeline system expansion, but are not intended to be a definitive evaluation of Guardian's project.

The WG, WEPCO and WPSC laterals require permits and authorizations from the Wisconsin Department of Natural Resources (DNR) before construction of regulated facilities could occur. The Guardian project is also subject to permits and authorizations from the DNR. DNR will issue its own environmental review to meet its WEPA compliance requirements before making permit decisions for both the lateral projects and the Guardian project.

DNR staff provided assistance to PSC staff in the development of this EA. Primary assistance was provided by Ben Callan, Linda Talbot and Thomas Boos on wetland and waterway issues, by Shari Koslowsky on rare species and communities issues, and by Steve Ugoretz and David Siebert, all of the DNR Office of Energy.

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Chapter 1 - Introduction

Natural gas utilities in Wisconsin receive their natural gas supplies through pipelines owned by interstate pipeline companies. The utilities then distribute the natural to retail customers. One of the interstate pipeline companies serving the state, Guardian Pipeline LLC, currently operates a single pipeline that transports natural gas supplies into southeast Wisconsin.

Guardian is proposing to expand the delivery capacity of its existing pipeline by constructing two new compressor stations along its current pipeline facilities and extending its pipeline facilities by constructing approximately 110 miles of new pipeline from the current terminus in Ixonia, Wisconsin to a new terminus west of Green Bay, Wisconsin. This is referred to as the Guardian II (or G-II) project. Guardian's project is subject to certification by the Federal Energy Regulatory Commission (FERC).

Three Wisconsin natural gas utilities are proposing new facilities to connect their existing gas distribution systems to the proposed Guardian expansion. These local distribution companies (LDCs) are Wisconsin Gas LLC (WG), Wisconsin Electric Power Company (WEPCO) and Wisconsin Public Service Corporation (WPSC). The new facilities proposed by WG, WEPCO and WPSC include six lateral pipelines that have a total length of about 84 miles. The utilities' proposed facilities are subject to certification by the Public Service Commission of Wisconsin (PSC).

The three utilities have stated that, as a result of the growing demand for natural gas, the existing natural gas transmission pipeline capacity in eastern Wisconsin is regionally constrained. Moreover, eastern Wisconsin has not been able to benefit fully from new competition and expanded choices because it is currently served by a single interstate natural gas pipeline company. The utilities further state that the Guardian II project was developed in response to a Request for Proposal (RFP) issued by WG, WEPCO and WPSC regarding the acquisition of firm natural gas pipeline capacity to provide deliveries to various points in Wisconsin with an in-service date of November 1, 2008. Specifically, the RFP stated goals were to increase the physical pipeline capacity serving Wisconsin and expanded LDC access to competitive supplies and services for the benefit of the LDC retail customers. Following an evaluation of qualified proposals that were received, Guardian and the three utilities executed Precedent Agreements in February 2006. The Precedent Agreements laid out commitments binding Guardian and each of the three utilities to develop new pipeline facilities, along with commitments and obligations related to shipping natural gas supplies.

PROJECT DESCRIPTION

This Environmental Assessment looks at a number of related natural gas line projects. They can be grouped together into a backbone project, the Guardian mainline, and a set of lateral gas pipelines that extend from the Guardian mainline into local natural gas distribution systems. Each component is described below.

Guardian Extension

Guardian Pipeline LLC owns and operates an interstate natural gas pipeline. Guardian currently has a large, high-pressure natural pipeline that extends into Wisconsin from Illinois, crossing through Walworth and Jefferson Counties. Guardian's existing pipeline ends near Ixonia in northeastern Jefferson County.

Guardian proposes to extend its existing pipeline system by constructing about 110 miles of 30-inch and 20-inch diameter pipeline between Jefferson and northeastern Outagamie Counties. Figure 1 is a general project map. Guardian would also construct two 39,000 hp compressor stations, one in De Kalb County, Illinois, and the other in Walworth County, Wisconsin.

This project is subject to an overall construction authorization by the FERC (FERC docket CP07-8) and certain permits from the Department of Natural Resources (DNR).

Hartford/West Bend Lateral

WG, a local natural gas utility, proposes to construct about 10 miles of 12-inch diameter gas pipeline through Dodge and Washington Counties to connect the Guardian extension to the existing WG distribution system in the Hartford area. WG also proposes to construct about 4 miles of 12-inch diameter gas line in Washington County to connect the existing distribution systems in Hartford and West Bend areas. These two segments of new pipeline are jointly referred to as the "Hartford/West Bend lateral." Figures 2 and 3 show the routes proposed.

The Hartford/West Bend project is subject to construction authorization by the PSC (PSC docket 6650-CG-220) and certain permits from the DNR.

Fox Valley Lateral

WG and WEPCO, both local natural gas utilities, propose to jointly construct about 13 miles of 20-, 16-, 12-, and 8-inch diameter pipeline in Outagamie, Brown and Calumet Counties. The project would tie the Guardian extension to the existing WG and WEPCO gas distribution systems in the Appleton, Kimberly and Combined Locks areas. This project is referred to as the "Fox Valley lateral." Figure 4 is a general project map.

The Fox Valley lateral project is subject to construction authorization by the PSC (PSC docket 5-CG-103) and certain permits from the DNR.

Sheboygan Lateral

WPSC, a local natural gas utility, proposes to construct about 33 miles of 16-, 14-, and 12-inch pipeline in Fond du Lac and Sheboygan Counties. This project is referred to as the "Sheboygan lateral" and would connect the Guardian extension to WPSC's existing distribution systems in the Plymouth, Kohler and Sheboygan areas. Figure 5 is a general project map.

The Sheboygan lateral project is subject to construction authorization by the PSC (as part of PSC docket 6690-CG-160) and certain permits from the DNR.

Chilton Lateral

WPSC also proposes to construct about two miles of 4-inch pipeline in Calumet County. This project is referred to as the "Chilton lateral" and would connect the Guardian extension to WPSC's existing distribution systems in the Chilton area. Figure 6 is a general project map.

The Chilton lateral project is subject to construction authorization by the PSC (as part of PSC docket 6690-CG-160) and certain permits from the DNR.

Denmark Lateral

Another lateral proposed by WPSC involves construction of about 14 miles of 12-inch pipeline in Brown County. This project is referred to as the "Denmark lateral" and would connect the Guardian extension to WPSC's existing distribution systems in the Denmark area. Figure 7 is a general project map.

The Denmark lateral project is subject to construction authorization by the PSC (as part of PSC docket 6690-CG-160) and certain permits from the DNR.

Southwest Green Bay Lateral

The final lateral pipeline proposed by WPSC, referred to as the "Southwest Green Bay lateral," involves construction of about 8 miles of 20- and 12-inch pipeline in Brown County. This lateral would connect Guardian's extension to existing distribution systems in and around the Green Bay metropolitan area. Figure 8 is a general project map.

The Southwest Green Bay lateral project is subject to construction authorization by the PSC (as part of PSC docket 6690-CG-160) and certain permits from the DNR.

West Green Bay meter station

WPSC would also connect to the proposed Guardian extension at a site in the northeastern corner of Outagamie County. This connection would tie the Guardian extension to WPSC's existing Green Bay area natural gas distribution system. The connection point, referred to as the "West Green Bay meter station," would be located at the end of Guardian's proposed extension. WPSC's existing distribution system can be tied into this location without installing any additional pipeline for the connection. All of WPSC's proposed meter station equipment would be located within a new meter station built and owned by Guardian at this location.

The West Green Bay meter station project is subject to construction authorization by the PSC (as part of PSC docket 6690-CG-160).

CONSTRUCTION METHODS AND WORK SPACE

Most of the pipeline that is included in the proposed Guardian expansion and the associated laterals would be installed through what is commonly referred to as “open cut” methods.

To prepare the construction ROW for open cut pipeline installation, the ROW, in some locations, may need to be cleared of underbrush and trees. Specialized equipment such as blade mowers would be used. The ROW must also be properly graded. Bulldozers, backhoes, and graders are typically used to bring the ROW to the proper grade. This same equipment is also used to separate the topsoil from the subsoils. The actual digging (open cutting) of the trench would generally be accomplished using backhoes or trenchers. In wetland areas where the topsoil would not be stripped for the entire ROW, backhoes (either rubber tired or tracked) would be used.

Generally, the pipe would be delivered to the construction area by stringing trucks. The pipe would be unloaded from these vehicles at the ditch side using side booms and/or backhoes. Pipe bending equipment may also be required. After the pipe has been placed in pipe strings along the ditch line and prior to welding, the pipe must be loaded onto wooden skids. This is normally accomplished through the use of side booms. The welding process requires the use of various pieces of equipment to align, weld, and test each joint. Welding rigs and test equipment are normally self-contained and would be transported to and on the site using smaller pick-up type vehicles.

After the welding operation is completed, the pipe is placed into the trench using side booms. Bulldozers, backhoes, and graders are used to fill the ditch once the pipe has been placed in the ditch. This same equipment would also be used to return the ROW to its original grade. Pick-up trucks, dump trucks, tankers, compaction-related equipment, pumps, welding tents, and hydrostatic testing equipment along with other miscellaneous equipment can be anticipated to be used for projects of this magnitude.

Also, various types of boring processes currently employed in the industry would be used at specific locations along the proposed projects. The final determination of the specific boring equipment and methods employed would generally be determined by the length of the bore, the anticipated soil conditions, the installation contractor’s preference, and the comparative costs of the methods under consideration. Permit requirements might also determine where boring methods are used.

It is anticipated that under normal conditions, the pipe would be installed with 3 to 5 feet of ground cover over the top of the pipe. Generally, the trenches would be 6 feet deep. These depth guidelines may vary somewhat in specific instances where soil conditions, terrain or other considerations may require different depths. The width at the top of the trench would vary with depth and soil conditions. Under normal conditions, the trench width would be 6 feet. The maximum width of the trench (at the surface) would not be expected to exceed 12 feet.

During construction of the pipelines, the applicants would acquire an easement that would allow enough space to operate the construction equipment and allow space for stockpiling segregated

soils, etc. Following construction, a permanent easement centered along the pipeline would be retained to protect against excavations near the pipe and to allow access for maintenance and repair. The permanent easement is usually considerably narrower than the construction easement.

Portions of the proposed lateral projects would occur within the ROWs of existing roads. In these situations, authorizations to work in and occupy parts of the ROW are usually granted to the applicant, rather than the acquisition of an easement.

WG has indicated that for the Hartford segment of the Hartford/West Bend lateral, which primarily crosses agricultural lands, the construction easement would be 100 feet wide, and the permanent easement would be 50 feet wide. WG also indicated that in some resource sensitive areas, such as wetland crossings and forested areas, the construction easement could be narrowed to 75 feet. All construction of the West Bend segment of this lateral would occur within existing road ROW.

WG and WEPCO have indicated that the portions of the proposed Fox Valley lateral that would cross agricultural lands would involve a construction easement that would be 125 feet wide, with a 50-foot width retained for the permanent easement. Most of the remainder of the project would be within existing road or other municipally-controlled ROW.

WPSC's proposed laterals include a variety of pipeline sizes and a variety of routing situations. In general, the construction work space width when open farmlands are being crossed would be 100 feet. Where the proposed Sheboygan lateral would occupy parts of an existing electric transmission line ROW, the construction work space would be widened to about 150 feet. Where WPSC lateral lines are proposed to be adjacent to existing roadways, the construction work space would be narrowed to 85 feet in width. WPSC has noted that where possible, it would attempt to narrow the construction work space to a width of 75 feet when crossing sensitive resources such as wetlands and forested areas. The width of permanent easements on private lands would generally be 50 feet. Much of the proposed Southwest Green Bay lateral would be built within existing road ROW and would not require additional work space on private lands.

Guardian proposed to acquire a 110-foot wide construction workspace for the 30-inch segment of its proposed project and an 80-foot wide construction work space for the 20-inch segment. Guardian also indicated that for wetland and upland forest crossings the construction easement could be narrowed to a width of 75 feet. The permanent easement would be 50 feet wide along all portions of the Guardian project.

The Surface Waters and Wetlands sections of Chapter 2 describe additional construction methods that would be used for installing pipelines across waterways and wetland areas.

CONSTRUCTION SCHEDULE

Guardian, WG, WEPCO and WPSC all propose to begin construction activities in early 2008, with construction continuing throughout the year. Initial site clearing and grading for meter and

regulator stations associated with the lateral pipelines may begin in late 2007 after all required authorizations and permit are granted. All of the proposed facilities are targeted to be in service by November 1, 2008.

ALTERNATIVES

The PSC has three alternative courses of action in processing the applications for the lateral pipeline projects. It may grant the requested Certificates with or without conditions; deny the Certificates; or postpone the actions pending further study.

If the PSC postpones or denies the lateral pipeline applications, the project-specific short- and long-term environmental impacts described in this EA would not occur, at least in the near term. In addition, the stated purposes of the proposed laterals would not be met: that is to allow the applicants to shift expiring contracts for interstate gas transportation service into certain parts of their service territories from ANR to a second interstate pipeline; to add interstate pipeline capacity into northeastern Wisconsin to ensure service for growing demands; and to provide their customers with long term access options to a variety of natural gas supplies, storage and transportation.

If either the Guardian expansion project or the utility lateral projects are denied, it is still possible that another proposal to expand interstate pipeline capacity into northeastern Wisconsin might be developed in the near future. The overall environmental impacts associated with such a new pipeline project would likely be similar to that of the current proposed Guardian expansion and associated laterals. The site-specific impacts, however, may be different and would depend on the specific facilities and routes proposed. There is no accurate way to predict the likelihood of such a new interstate pipeline project being proposed, to predict the size and number of associated lateral pipelines, or to predict the routes that would be proposed. The environmental impacts of new utility laterals to connect to a different interstate pipeline expansion could be greater, lesser, or the same as the environmental impacts associated with the current proposed projects.

DNR staff has indicated that in DNR's review of permit application, it may deny, grant, or grant with conditions the permits and approvals for each regulated waterway or wetland crossing. This determination is based on the standards set by state law and regulations. The conditions included in the permits may cover details such as the timing of construction, approved methods and mitigation and restoration requirements.

Chapter 2 - Overall Environmental Impacts

This Chapter discusses some of the common environmental impacts associated with construction of natural gas pipelines. The discussions in the Chapter are relevant to all of the proposed projects.

Additional information on rare species and communities, surface waters, wetlands and historic resources can be found in chapters 3 through 9. Chapter 5 has an expanded discussion of the Kettle Moraine State Forest and Chapter 7 provides further information on the Niagara Escarpment.

GENERAL VEGETATION, FISH AND WILDLIFE

The vegetation types crossed by the proposed lateral pipelines and the G-II pipeline route historically consisted of southern mesic forests dominated by broadleaf trees in the southern portion of the state and northern mesic forests with a mixture of conifers and deciduous trees in the northern half. These two forest types are connected by an area known as the Tension Zone. Forested areas within the Tension Zone support plant species that are found in both the northern and southern forests. The trees that are commonly associated with these forest types are maples, ash, basswood, walnut, some oaks, and more conifers and aspen further to the north. Current plant cover types along the G-II and lateral pipeline routes reflect the intensive historical tree-clearing and agricultural activities and present-day agricultural practices in this part of the upper Midwest. In recent decades, residential and commercial developments have also become more widespread in the region. The southern broadleaf forest and northern mixed forest cover along the pipeline routes have been greatly reduced by conversion to cropland or other agricultural purposes. A few remnants of the original forests are found in strips and patches of forested land that occur along the proposed ROWs, primarily on ridges and slopes, along property lines, roads and railroads, along streams, rivers and lakes, and in some wetland areas. These forest remnants provide habitat for plants and resident wildlife, corridors for wildlife movement, and havens for migratory stopovers.

The DNR has also divided this region into two ecological landscapes that consider the environmental conditions that create the observed land cover: the Southeast Glacial Plains Ecological Landscape and the Central Lake Michigan Coastal Ecological Landscape.

The Southeast Glacial Plains Ecological Landscape makes up the bulk of the non-coastal land area in southeast Wisconsin. This Ecological Landscape is predominantly glacial till plains and moraines. Agricultural and residential development throughout the landscape has significantly altered the historical vegetation. Most of the rare natural communities that remain are associated with large moraines or in areas where exposed faces of the Niagara Escarpment occurs at the surface. Historically, vegetation consisted of a mix of prairie, oak forests and savanna, and maple-basswood forests. Wet-mesic prairies, southern sedge meadows, emergent marshes, and calcareous fens were found in low-lying portions of the Landscape. The current vegetation is primarily agricultural cropland. Remaining forests occupy only about 10% of the land area and consist of maple-basswood, lowland hardwoods, and oak. No large mesic forests exist today

except within the Kettle Moraine State Forest and areas too rugged for agriculture. Some existing forest patches that were formerly savannas have succeeded to hardwood forest due to fire suppression.

The Central Lake Michigan Coastal Ecological Landscape stretches from southern Door County west across Green Bay to the Wolf River drainage, then southward in a narrowing strip along the Lake Michigan shore to central Milwaukee County. Owing to the influence of Lake Michigan in the eastern part of this landscape, summers are cooler, winters warmer, and precipitation levels greater than at locations farther inland. Dolomites and shales underlie the glacial deposits that blanket virtually all of this Landscape. The dolomitic Niagara Escarpment is the major bedrock feature, running across the entire landscape from northeast to southwest. A series of dolomite cliffs provide critical habitat for rare terrestrial snails, bats, and specialized plants. The topography is generally rolling where the surface is underlain by ground moraine, variable over areas of outwash, and nearly level where lacustrine deposits are present. Historically, most of this landscape was vegetated with mesic hardwood forest composed primarily of sugar maple, basswood, and beech with hemlock and white pine restricted to sites near Lake Michigan. Emergent marshes and wet meadows were common in and adjacent to lower Green Bay. Small patches of prairie and oak savanna were present in the southwestern portion of this landscape.

Both of these ecological landscapes are marked by the significant and ongoing loss of the original habitat and the dominance of agriculture and an increasingly urbanized/residential component. Fragmentation of upland habitats is severe throughout this landscape. Invasive species have become a major concern in both terrestrial and aquatic habitats.

Within these ecological landscapes or major vegetation types there are several general habitat types applicable throughout: agricultural land, open land that includes primarily fallow fields, old fields, railroad corridors and CRP lands, forested land, open water, and developed areas. The wildlife associated with these general landcover/habitat types is listed in the table found later in this section.

The six lateral pipeline projects together would affect about 40 acres. In addition, about 63 acres of wetland would be impacted during construction of the proposed Guardian mainline, for an overall total of about 103 acres of affected wetland. As further discussed in the section on Wetlands, most of the potential impacts would be temporary in duration, with no substantial long-term impacts anticipated.

About 20 acres of forest would be affected by construction of the six lateral pipelines and about 52 acres of forest land would be directly affected by construction of the Guardian mainline. The combined total would be about 72 acres of forest land. These figures represent the area that would be cleared of all trees in the construction work space.

The removal of the tree cover is a substantial change to the plant and animal communities in the areas cleared. The change would be permanent for much of the area cleared within the permanent easement. The temporary workspace would be allowed to revegetate after construction is complete. Secondary impacts associated with the clearing of existing vegetation may include a temporary increase in soil erosion and runoff, increased soil temperatures, soil

mixing and soil compaction, and possible root damage and increased wind throw of trees adjacent to newly cleared areas. Clearing of canopy vegetation would also produce higher light levels in the understory and may allow early successional species to become established along the edge of the newly cleared areas. These effects would vary in their severity, depending on the ecological conditions at the site. In general, most of the forested communities are secondary growth on areas that have been previously disturbed and therefore, forest cleared within the temporary workspace would be more likely to recover with minimal impact.

There are no extensive individual wooded areas that would be cleared of trees. The amount of tree clearing needed for any specific wooded area is small, consistent with the highly fragmented and developed nature of the landscape in the project area.

One of the lateral projects, the WPSC Sheboygan lateral, does cross an area with extensive forest lands, the Kettle Moraine State Forest – Northern Unit. The proposed route through the Kettle Moraine Forest, however, lies within a ROW already cleared of trees for a high-voltage electric transmission line. No additional tree clearing would be necessary in this area.

Representative Wildlife Species within Existing Vegetation Types

Habitat Type	Representative Species	Habitat Type	Representative Species
Agricultural Land/Open Land	Deer mouse Meadow vole Woodchuck Eastern cottontail rabbit Virginia opossum Striped skunk Red fox Coyote White-tailed deer American goldfinch Eastern meadowlark Dickcissel Red-winged blackbird Ring-necked pheasant Snow goose	Open Water/Aquatic Habitats	Great blue heron Common muskrat Great egret Mink Snapping turtle Green frog Canada goose Beaver Green heron American bittern Mallard Shoveler Greater yellowlegs Black-bellied plover
Non-forested Wetland	Common snipe Sedge wren Mink Northern harrier Mallard Green frog Sora Common muskrat Raccoon	Forested Wetlands/ Floodplain Forests	Wood duck Beaver River otter Wood thrush Barred Owl White-tailed deer Mink Yellow warbler
Southern Broadleaf Forest	White-tailed deer Raccoon Gray squirrel Wild Turkey American toad Tiger salamander Eastern garter snake Red fox Red squirrel Sharp-shinned hawk	Developed Land	Raccoon Gray squirrel Blue jay Mourning dove European starling American robin Chipping sparrow Common grackle American crow

Representative Wildlife Species within Existing Vegetation Types			
Habitat Type	**Representative Species**	**Habitat Type**	**Representative Species**
Northern Mixed Forests	Ruffed grouse Black bear American Beaver Eastern chipmunk Broad-winged hawk Veery Red-eyed vireo Leopard frog Pileated woodpecker Raccoon Red squirrel Black-capped chickadee		

RARE SPECIES AND COMMUNITIES

"Rare Species" or "Special status species" are those which state or federal agencies protect by law, regulation, or policy. For the purposes of this EA, these species include those federally listed as endangered or threatened under the Federal Endangered Species Act (ESA), species that the U.S. Fish and Wildlife Service (FWS) is considering for listing, species that are state-listed as threatened or endangered under the Wisconsin Endangered Species Law, and those listed as state species of special concern.

Subsequent chapters of this EA specific to the Guardian mainline and each of the laterals summarize potential impacts to rare species and natural communities. The evaluation of these resources is based on data contained within the DNR Natural Heritage Inventory (NHI) Database, which summarizes and maps occurrences of rare species and natural communities throughout the state. This region of the state, because it is dominated by agriculture, does not have many NHI occurrences. Many of the occurrences are associated with waterways, or are species that do not have large area habitat requirements (e.g., insects and snails).

Regardless of where a proposed project is located, the NHI database is incomplete and so species and habitat information is supplemented with other sources, input from DNR staff, and field visits. DNR staff coordinated the review and evaluation of potential impacts to rare species and natural communities with WG, WEPCO and WPSC.

SURFACE WATERS

Construction of the proposed mainline and lateral projects would require 176 waterbody crossings. Of these crossings, 119 are streams that are intermittent, with periods of the year where no water flow occurs. The remaining 57 crossings are perennial waterways with flow year-round. Included in the perennial crossings are one Outstanding Resource Water (ORW), one Section 10 waterway, and six trout streams.[1]

[1] Outstanding Resource Water (ORW) - ORWs are defined as surface waters that provide one or more of the following: valuable fisheries, hydrological or geologically unique features, outstanding recreational opportunities, unique environmental settings, or have been identified by the public, and been

Potential Impacts to Surface Waters and Aquatic Life

Impacts to surface waters would be limited primarily to the period of construction and restoration and are dependent on the season, duration, and method of pipeline installation. After the pipeline is installed, waterbody beds and banks would be restored, as near as practicable, to original condition. Disturbed soils adjacent to the waterbodies would be stabilized and reseeded with approved seed mixes.

Potential impacts on fish and other aquatic resources from construction and operation of the proposed pipelines include sedimentation and turbidity, destruction of stream habitat, and introduction of water pollutants.

Installation of a pipeline across a stream or river can temporarily displace stream bed sediments and increase erosion of soils adjacent to the waterbody. The magnitude and duration of these effects depends on the soils and topography of the site, and the proposed crossing method. Construction could also change the stream bottom profile, resulting in increased siltation or erosion at the site or further downstream. DNR waterway permit staff has indicated that the DNR permit would require restoration of the streambed contours to preconstruction conditions.

Increased sedimentation and turbidity from the proposed construction have the greatest potential to adversely affect fisheries resources. Trout spawning areas are especially susceptible to increased sedimentation by fine particles. Increase of fines composition less than 3 millimeters in size can reduce survival of eggs and emerging fry and degrade spawning habitats.

Some in-stream and shoreline cover may be altered or removed at the proposed stream crossings. Stream bank vegetation, in-stream logs, rocks, and undercut banks provide important cover for fish. Fish that normally reside in or pass through while foraging in these areas would be displaced during construction.

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adopted by the Natural Resource Board for protection from point source pollution. Also included in this category are all National Wild and Scenic Rivers excluding portions flowing through Indian lands, and all State Wild and Scenic Rivers. ORWs are designated by the DNR and are listed in the Wisconsin Administrative Code Chapter NR 100.

Section 10 Waterway - Navigable Waterways are designated by the U.S. Army Corp of Engineers (COE) under Section 10 of the 1899 Rivers and Harbors Act and were identified from the publication *Navigable Waters of the United States Within the State of Wisconsin*

Trout Streams - Trout streams are designated by the DNR in three Classes. Class I trout streams are high quality waters, with self-sustaining natural reproduction that keeps populations at or near carrying capacity. Class II trout streams have some natural reproduction, but not enough to utilize available resources. Some stocking is necessary to maintain a sport fishery. These streams have a good survival rate and show a carryover of stocked trout. Class III trout streams are marginal trout habitats with no natural reproduction. Annual stocking of legal-size fish is required to provide a fishery. There is generally no carryover from one year to the next.

Fish spawning habitat could be destroyed by pipeline construction activities. Trout spawning areas, in particular, require specific substrates which may occur within the pipeline crossing areas. Successful spawning may also require groundwater upwelling that could be disrupted temporarily or permanently at the stream pipeline crossing locations.

Some fish, including trout, have spawning runs in the spring, summer, or fall which could be interrupted by pipeline construction. This interruption would be the result of construction activities blocking or discouraging fish from passing through the construction zone. Most runs occur over several days or weeks in small streams. Consequently, in the worst case, migration might be briefly interrupted, or sites where eggs were deposited might be destroyed. Larvae of some species of fish disperse by drifting upon hatching, which could be interrupted by pipeline construction blocking water flow.

Spills of fuel or other substances from construction equipment into streams could be toxic to fish, depending on the type, quantity, and concentration of the spill. Further discussion of spills and the proposed plans to reduce spill potential can be found in a separate section of this EA.

The linear nature of pipeline construction acts as a vector for spreading invasive species. Purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundinacea*), Eurasian water milfoil (*Myriophyllum spicatum*), and zebra mussels (*Dreissena polymorpha*), among others, may be spread by construction activities. Further discussion of invasive species can be found in a separate section of this EA.

Construction Techniques for Crossing Waterways

Overall Process

There are a variety of methods of installing a pipeline across a waterway. The applicants have identified a preferred method for crossing each stream as listed in their permit applications. The applicants selected their preferred crossing methods based on the physical and engineering characteristics of the crossing, the general environmental sensitivity of the water resource, and input received from regulatory agencies. The DNR Chapter 30 permit would dictate the construction method to be used at each waterway.

The proposed mainline and lateral projects include the use of five distinct construction methods for crossing waterways:

- open trench;
- dam and pump;
- flume;
- horizontal direction drill; and
- bore and jack.

These crossing methods have common procedures and unique components, which are discussed below. These construction practices are based on the descriptions of proposed construction

methods in the project applications. The general construction practices proposed by Guardian, WG, WEPCO and WPSC are similar.

Standard crossing methods normally require a gradual and uniform approach to the waterbody to prepare and place the pipeline and provide a suitable work area for construction equipment. This usually requires removing bank vegetation and grading the banks away from the waterbody. This process could temporarily increase the potential for soil erosion until construction is complete and the right of way is stabilized and reseeded.

Erosion control measures would be installed before construction. Temporary erosion controls would typically include storing all excavated spoil in containment areas that prevent the spoil from entering the stream, and installation of silt fence and/or straw bales to prevent runoff from upland areas from entering the stream.

Temporary extra workspaces on each side of the waterbody for staging the crossing are generally required. These temporary extra workspaces are assumed to be approximately 50 feet wide by 150 feet long. Vegetation between the extra workspace and the waterbody would not be removed except within the construction ROW.

Following installation of the pipeline across the waterway, the ROW on either bank would be regraded to its approximate preconstruction contours. Disturbed stream and river banks would be stabilized with biodegradable geotextile fabric, jute thatching, or bonded fiber blankets. Disturbed soils would be fertilized, seeded, and mulch would be applied as needed. Temporary bridges that were installed to move equipment across the waterbody would be removed after seeding and mulching are complete. Temporary erosion control measures would be removed after permanent erosion control measures are installed and vegetation is re-established.

Open Trench Crossing Method

During an open trench crossing, a trench would be excavated through the stream using draglines or backhoes operating from one or both banks. The potential impacts to a waterway and its biota from open trench construction are quite different if the trenching is done when the waterway has flowing water as compared to no-flow situations.

DNR waterway permit staff has indicated that open trench installation of the proposed pipelines would be limited to intermittent waterways with no flowing water at the time of construction. If there is water flow, one of the other crossing methods would have to be used. This environmental assessment assumes that the open trench construction would be allowed only during times of no stream flow.

Restricting open trenching to times of no flow eliminates the direct construction impacts to the stream's water column, avoiding the associated sedimentation of habitat for fish and aquatic invertebrates, water quality degradation, and reduction in light penetration affecting photosynthesis. No long-term impacts to the stream would be expected if the contours of the streambed are restored to their pre-construction condition, which DNR waterway permit staff has indicated would be required as part of the Chapter 30 permit.

Dam and Pump Crossing Method

The dam and pump stream crossing method is slower and more expensive than the open trench method, however it generally reduces the water quality impacts associated with open trenching. It is also preferred for small streams that are sensitive to sediment loading. This method involves damming the stream upstream and downstream of the construction area before trench excavation using sand bags or other methods that greatly minimize the addition of sediment to the stream. Before the dams are installed, one or more water pumps would be placed on the upstream side of the proposed trench and water would be pumped around to the downstream side of the construction area. The placement and removal of the pumps and damming material would create some minor sediment disruption. Energy dissipation devices would be used as necessary downstream of the crossing where the pump hose discharges to prevent scouring of the stream bed. Trenching, installation of the pipeline, and restoration of the banks and ROW would be completed in the same manner as described for the open trench method. However, because the stream flow is pumped around the construction area instead of through it, only minimal sediments would be displaced by construction. The use of the bypass pumping to redirect stream water flow around the construction area would temporarily block movement of fish and other aquatic organisms through the area.

Flume Crossing Method

The flume method is suitable for small to intermediate streams which have straight channels at the crossing area and are sensitive to sediment loading. Flumes made of large pipe sections would be aligned in the stream parallel to the water flow. The stream would then be dammed with a diversion bulkhead to direct stream flow through the flumes. A similar bulkhead would be installed at the downstream end of the flumes to prevent backwash from entering the construction area. Energy dissipation devices would be installed as needed to prevent scouring at the discharge location. A trench would then be excavated underneath the flumes in the dried-out section of stream bed. A section of pipeline long enough to span the stream would be welded together and pulled beneath the flume. The flumes would not be removed at any time during the installation of the pipeline. Backfilling and bank restoration would be completed as described for the open trench method. Fluming, like the dam and pump method, isolates stream flow from the construction area and allows installation of the pipeline without significant displacement of sediments. The use of the flume to redirect stream water flow through the construction area would likely be a temporary hindrance to movement of fish and other aquatic organisms.

Horizontal Directional Drill Crossing Method

Directional drilling minimizes the environmental effects of pipeline construction on a waterbody or waterway by going beneath its bed and avoiding direct disturbance of the bed and banks. This technique is especially useful for wide crossings, where navigation traffic is high, areas where bottom sediments are contaminated, or where there are sensitive habitats or cultural resources near the banks. The HDD method involves using a special drill rig to drill a hole similar to a well hole, but with a gentle curve that is almost horizontal, just below the surface of the ground

and the bed of the waterway. When it exits on the opposite side of the stream, the drilling machine then pulls a long, pre-welded pipeline section back through the drilled hole.

Temporary workspaces would be established for drilling equipment, measuring approximately 250 feet long by 50 feet wide on the entry side of the crossing. A slant drill unit would be placed on one bank and a small-diameter pilot hole would be drilled under the stream along a prescribed profile. Electromagnetic sensors are used to guide the path of the drill bit. After the pilot hole has been completed, it would be enlarged to accept the pipeline by pulling a barrel reamer back to the drilling rig. Several passes might be required to enlarge the bore hole. Drilling mud would be continuously pumped into the hole to remove cuttings and maintain the integrity of the enlarged hole. After the hole has been reamed, a prefabricated pipeline section long enough for the crossing would be pulled through the hole by the drilling rig.

The use of the HDD method avoids most of the potential impacts that are a concern with pipeline crossings of waterways, as the pipeline is installed beneath the bed of the waterway. There is no disturbance or change to either the waterway's bed or water column. Many of the potential concerns associated with some other methods of crossing waterways, including sedimentation and turbidity, habitat alteration, disrupting breeding and movement patterns, and the introduction of pollutants into the water column, are not factors when the HDD method is used.

Environmental impacts associated with this technique include additional workspace requirements for storage of drilling mud. HDD construction uses a drill "mud" under pressure to lubricate the drill pipe, remove drill cuttings and maintain the integrity of the drill hole. The drilling mud is usually a water-based slurry of bentonite clay. An emulsifier is sometimes added to the slurry. Drilling mud and cuttings would also require disposal.

Pressurized drilling mud may leak to the surface, or "frac-out." Such failures are not easily predicted; however, the impacts from failure can be reduced by monitoring mud pressure and drilling head location, inspecting the surface during the drill process, and by increasing the depth of the drill path below the bed of the river. It should be noted that in most cases the volume of sediment resulting from seepage of drilling mud would be far less than the amount produced by a conventional open-cut crossing.

During the crossing, drilling mud is stored away from the river in an earthen berm containment structure or fabricated containment tanks sized to accommodate the volume of mud necessary for the drill. Following completion of directional drilling, mud is disposed of in accordance with applicable state and local requirements. Where landowner permission is available, mud is typically land-spread in upland, agricultural fields. If landowner permission is not available or land-spreading is not appropriate for some other reason, drilling mud would be disposed of in a landfill or other authorized disposal site.

If an unanticipated frac-out were to occur in an upland setting, the drilling mud would be contained to the extent possible with erosion control measures such as silt fences and/or hay bales, then disposed of properly by removing and spreading over an upland area or hauled off-site to an approved location.

Frac-out can occur in the bed of a waterbody or an adjacent wetland. In the case of an in-stream frac-out, the HDD activity would stop and potential options would be evaluated. If proceeding with the directional drill crossing method would result in significant adverse impacts to waterbodies and fisheries resources, the HDD would be abandoned and an alternative crossing method started. In the case of a wetland frac-out, the slurry at the surface would be isolated using silt fence and/or hay bales, then removed by vacuum truck, machinery, or by hand, and disposed of in an acceptable upland location.

Bore and Jack Crossing Method

Bore and jack installation is a method used primarily to install pipe underneath a surface or shallow obstructions, such as roads, railroads, other existing utilities. In some instances it may be used to install a pipeline under waterways. This method goes by various names, such as auger boring or pipe jacking. Construction using the jack and bore method is typically limited to a distance of approximately 300 to 400 feet.

Two construction pits are dug with bore and jack construction, a jacking pit and a receiving pit. The pits are typically about 15 feet wide and 35 feet long. A rotating boring machine is used to create a hole, starting from the jacking pit and ending in the receiving pit. A casing pipe, larger in diameter than the gas pipe, is pushed into the hole following the boring machine. After the casing pipe has been installed between the jacking and receiving pits, the gas pipe is slid into the casing pipe. The void area between the casing pipe and the bored soils is filled with grout and the area between the casing pipe and the gas pipe is filled with pea gravel or sand.

There is little potential for a frac-out condition occurring during bore and jack installation, unlike that for a HDD installation, because the bentonite drilling slurry is not pressurized. The unpressurized drilling slurry would not have a force mechanism to push it far enough out of the drill hole to result in a frac-out release.

The use of a bore and jack method to install a pipeline avoids most of the potential impacts that are a concern with pipeline crossings of waterways. This is the result of the pipeline being installed beneath the bed of the waterway. There is no disturbance or change to either the waterway's bed or water column. Many of the potential concerns associated with some other methods of crossing waterways, including sedimentation and turbidity, habitat alteration, disrupting breeding and movement patterns, and the introduction of pollutants into the water column, are not factors when the bore and jack method is used.

Operation and Maintenance Related Impacts

Other than inspections from vehicles and routine removal of brush and trees, there should be little long-term disturbance of the corridor, and associated long-term effects on water quality due to operating and maintaining the proposed pipeline pipelines. Catastrophic effects due to pipeline failures during operations and maintenance are possible, but unlikely.

Waterway Summary

The majority of waterways that would be crossed by the proposed pipeline construction are intermittent, with no flowing water during portions of the year. DNR permit staff has indicated that open cut trench construction to cross these intermittent waterways would be allowed only at times of no flow. Open cut trenching would not be allowed if a steam has flowing water. Crossing the intermittent streams during no-flow periods with open cut trenching would not alter the streams' water quality or have any direct effect on aquatic life. With simple restoration efforts, there would also not be any substantial change to streambed configuration or flow characteristics as a result of using this method.

Each of the perennial waterways that would be crossed are identified and discussed in the project-specific chapters of this EA. The potential environmental consequences to the waterways that would be crossed using HDD or bore and jack pipeline construction method would be minimal, due to the fact that those pipeline installation methods do not directly disturb the bed or water column of the waterway. The potential impacts to the other perennial waterways, those crossed using a dam and pump or flume method, are also expected to be minor, with impacts primarily related to temporarily inhibiting movement of fish and other aquatic organisms through the construction zone.

WETLANDS

Wetlands along the routes of the proposed pipeline projects fall into four major community types: wet meadow, emergent, scrub/shrub, and forested wetlands. Wet meadows include wet and sedge meadows, wet prairies and seasonally flooded basins. Emergent type wetlands include shallow marsh and deep marsh. Scrub–shrub type wetlands include shrub-carr and previously cleared wetlands dominated with shrub vegetation. Forested wetlands include hardwood swamp and floodplain forest. For the purposes of this assessment, the wet meadow and emergent wetlands are grouped together. The wetland community types follow accepted terminology for the Wisconsin region and are based on Eggers and Reed (1997)[2].

The following table shows the number of wetland crossings, broken down by project. The total number of wetlands crossed is 229.

[2] Eggers, Steve D., and Donald M. Reed. 1997. Wetland plants and communities of Minnesota and Wisconsin. U.S. Army Corps of Engineers, St. Paul District. 263pp.

Wetland Crossings by Project	
Project	Number of Wetland Crossings
Guardian	125
WG Hartford/West Bend	30
WG and WEPCO Fox Valley	22
WPSC Sheboygan	37
WPSC Chilton	2
WPSC Denmark	11
WPSC Southwest Green Bay	2

The wetland information in this section was in part obtained from Wisconsin Wetland Inventory maps. In addition, many of the wetlands have been field delineated using the 1987 Army Corps of Engineers Wetland Delineation Manual. A complete listing of the wetlands crossed, including the Wisconsin Classification, the approximate crossing length in feet, and the approximate acreage affected during construction is presented in the project applications.

Approximately 102 acres of wetlands would be temporarily impacted by construction of the proposed projects. This figure is based on the total construction work space in wetlands that would be used to build the proposed pipelines.

Summary of Wetland Impacts	
Project	Total Acres in Construction Zone
Guardian	62.3
WG Hartford	12.5
WG and WEPCO Fox Valley	2.4
WPSC Sheboygan	22.3
WPSC Chilton	1.2
WPSC Denmark	1.3
WPSC SW Green Bay	0.2
Total	102.3

Wet meadows includes wet and sedge meadows, wet prairies and seasonally flooded basins. Seasonally flooded basins are not typically classified as inland fresh meadows; however, they are included in this classification because like wet and sedge meadows, they are dominated by herbaceous vegetation. Wet and sedge meadow, and wet prairie communities, are characterized by a predominance of herbaceous vegetation with a limited amount of woody vegetation. These communities grow on saturated soils but can be dry for much of the growing season. Ponded water is typically present only after floods or snowmelt events. Reed canary grass (*Phalaris*

arundinacea) is the primary dominant species observed in wet meadow communities in the project area, often forming dense monotypic stands. Seasonally flooded basins are shallow depressions that typically pond water for a few to several weeks each year, but are usually dry for much of the growing season. Due to the brevity of this hydroperiod, these communities are often farmed.

Emergent wetlands are shallow open water plant communities that have deeper water than the wet meadow communities. Submergent, floating and floating-leaved aquatic vegetation characterize this community type. Shallow marshes have soils that are saturated to inundated by standing water up to a depth of about six inches throughout most of the growing season. Emergent vegetation such as cattails (*Typha*), bulrushes, arrowheads (*Sagittaria*), and lake sedges (*Carex*) are common in this community. These shallow marshes often intergrade with sedge or wet meadows where the soil is drier.

Scrub/shrub wetlands are wetland plant communities dominated by woody vegetation less than 20 feet tall with a diameter at breast height less than six inches. These communities grow on both organic and mineral soils with hydrology ranging from seasonal saturation to inundation for most of the growing season. Shrub-carr communities are dominated by willow (*Salix*) and/or dogwood (*Cornus*) shrubs with an understory typically comprised of various forbs, grasses, sedges, and ferns, and are found throughout Wisconsin.

Forested wetlands include hardwood swamps and floodplain forests. Hardwood swamps are often differentiated from floodplain forests due primarily to hydrologic setting and degree of soil saturation—floodplain forests occur in riverine systems on alluvial soils while hardwood/conifer swamps are typically associated with ancient lake basins and riverine oxbows. For the purposes of this EA, these communities were combined due to their relatively similar structural and vegetative composition.

Hardwood swamps are forested wetlands dominated by deciduous hardwood trees with a stratified understory of various shrubs, saplings, grasses, sedges, and forbs. This community is underlain by soils that are saturated for much of the growing season and may be inundated by as much as 12 inches of water. Hardwood swamps are found throughout Wisconsin. Similar to hardwood swamps, floodplain forests are also forested wetlands dominated by deciduous hardwood trees. However, this community is associated with riverine systems and is inundated during flood events, but is somewhat well drained during other portions of the year. These flooding events can limit the density of shrubs and herbaceous species in this community.

Wetlands of Special Natural Resource Interest

The wetlands crossed by the proposed pipeline projects were evaluated to determine whether any were wetlands of special natural resource interest. Wetlands of special natural resource interest are defined in Wisconsin Administrative Code NR 103.04 to include those wetlands both within the boundary of designated areas of special natural resource interest (ASNRI), and those wetlands which are in proximity to or have a direct hydrologic connection to such designated areas. ASNRI include:

- Cold water community as defined in § NR 102.04(3)(a), Wisconsin Administrative Code, including trout streams, their tributaries, and trout lakes.
- Lakes Michigan and Superior and the Mississippi River.
- State- or federally-designated Wild and Scenic River.
- State-designated riverway and scenic urban waterway.
- Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study.
- Calcareous fen.
- State park, forest, trail, or recreation area.
- State and federal fish and wildlife refuges and fish and wildlife management area.
- State- or federally-designated wilderness area.
- State-designated or dedicated natural area (SNA).
- Wild rice water listed in § NR 19.09, Wisconsin Administrative Code.
- Surface water identified as outstanding or exceptional resource water in Wisconsin Administrative Code ch. NR 102.

Habitats used by state or federally endangered species are also considered ASNRI. In addition, the Brown County Planning Department classifies wetlands adjacent to slopes of greater than 12 percent as being environmentally sensitive, which classifies them as ASNRI.

Further identification of the wetlands of special natural resource interest is provided in the project specific chapters of this EA.

Impacts of Pipeline Construction on Wetlands

A primary impact of pipeline construction and right-of-way maintenance activities on wetlands is the temporary removal of wetland vegetation. Construction also would temporarily diminish the recreational and aesthetic value of the wetlands crossed. These effects would be greatest during and immediately following construction. In wet meadow/emergent wetlands, the impact of construction would be relatively brief, since herbaceous vegetation regenerates within one or two seasons. In forested and shrub-dominated wetlands, the impact would last longer due to the longer recovery period of these vegetation types. On-going vegetation management on a portion of the right-of-way centered over the pipeline to allow access and inspection would permanently restrict regeneration of tree and shrub cover. Clearing of wetland vegetation would also temporarily, or in some cases, permanently, remove or alter wetland wildlife habitat.

Trench excavation is a major disturbance to that part of a wetland where the trench is located, but construction activities would also impact wetlands outside of the actual trench area. Compaction and rutting of wetland soils could result from the temporary stockpiling of soil and the movement of heavy machinery. Surface drainage patterns and hydrology could be temporarily altered, and there would be increased potential for the trench to act as a drainage channel. Trench breakers would be placed in the trench to prevent lateral flow of groundwater in the backfilled trench. Increased siltation in adjacent wetland areas may result from trenching activities, but can be limited by use of appropriate erosion control measures. Disturbance of

wetlands also could temporarily affect the wetland's capacity to reduce/moderate erosion and floods.

Construction through wetlands would comply, at a minimum, with Section 404 permit conditions and the conditions of the state's 401 water quality certification, including Wisconsin Administrative Codes NR299 and NR103.

The evaluation of potential impacts from crossing wetlands assumes that the DNR waterway and wetland permit would require use of appropriate erosion control practices along with the restoration of the wetland contours to preconstruction conditions.

Guardian, WG, WEPCO and WPSC have all described construction measures to be used for construction in wetland areas. In general, the proposed construction methods are similar. The following discussion summarizes the major components of these proposed construction methods.

Staging areas and extra workspace would be needed on both sides of some of the larger wetlands. These areas would be located at least 50 feet away from the wetland boundaries, where topographic conditions permit, and would be limited to the minimum area needed for assembling the pipeline. Storage of hazardous materials, chemicals, fuels, and lubricating oils would generally be prohibited within 100 feet of wetland boundaries.

Temporary erosion control devices would be installed at the base of cleared slopes leading to wetlands. If there is no slope, erosion control devices would be installed as necessary to prevent exposed soils from flowing off the ROW into the wetland or to prevent sediment from flowing from adjacent uplands into the wetlands.

During clearing, woody wetland vegetation would be cut at ground level and removed from the wetland, leaving the root systems intact. In most areas, removal of stumps and roots would be limited to the area directly over the trench. Stumps from areas outside of the trench line would be removed, as necessary, to provide a safe work surface.

To facilitate revegetation of wetlands, up to one foot of topsoil would be stripped over the trench, except in areas where standing water or saturated soils make it impracticable, where no topsoil layer is evident, or where the topsoil layer exceeds the depth of the trench.

The use of either low ground-pressure equipment or standard construction equipment operating from timber pads would reduce disturbance of wetlands with saturated soils or standing water. Imported rock, stumps, brush, or offsite soil would not be used as temporary or permanent fill in wetlands. Following construction, materials used in wetlands to provide stability for equipment access would be removed.

If the standard crossing method is not practical because of saturation or standing water, either a push/pull method or winter construction might be used. Use of the push/pull method is generally limited to large wetlands with standing water and/or saturated soils that have adequate access for pipeline assembly and equipment operation on either side of the wetland. If this method is used, a long section of pipeline would be assembled on an upland area of the ROW adjacent to the

wetland. Usually this requires use of extra temporary workspace adjacent to the ROW. The trench would be dug by a backhoe supported on timber mats. The prefabricated section of pipeline would then be floated across the wetland. When the pipeline is in position, the floats would be removed and the pipeline would sink into position. The trench would then be backfilled and the original contours would be restored by a backhoe working from construction mats.

Under frozen conditions, the pipe would be installed in wetlands similar to conventional upland construction. Because equipment is supported by frozen soil and ice, temporary mats would not be required. The success of winter construction depends on prolonged periods of subfreezing temperatures, which produce sufficient frost depth. Because these conditions are not always predictable, the ability to use the winter construction method is generally not assured. Ice roads may also be used to decrease impacts. Ice roads are created by plowing the snow off of the wetland surface, and driving sequentially heavier pieces of equipment across the wetland surface to facilitate the penetration of the frost deeper in the ground, creating a stable working surface.

Following restoration of contours, wetlands would typically be seeded with annual ryegrass as a cover crop. Other measures such as replacement of the original surface soil, with its stock of roots and tubers can facilitate restoration. The wetland would then be allowed to revegetate naturally to preconstruction vegetative covers or as directed by permits. No lime or fertilizer would be added to disturbed wetland areas, unless required in writing by the appropriate permitting agency. After a period of monitoring, wetlands that do not appear to be regenerating by this process would be seeded with an approved native seed mix.

The majority of the wet meadow wetlands are dominated by or contain reed canary grass, which is a very aggressive invasive plant. In wetlands that contain the grass, it is likely that, following construction, the ROW and workspace area would become dominated by the grass because of the disturbance and spreading of the plant rhizomes, which facilitate spread.

Operation of the pipelines would not require alteration of wetlands other than periodic brush and tree control in the pipeline's permanent ROW. No permanent filling, dredging or other long-term wetland disturbance is anticipated.

Federal Wetland Compensatory Mitigation requirement

As part of its federal permit requirements, Guardian proposes to mitigate the expected wetland impacts in accordance with the U.S. Army Corps of Engineers requirements. Moreover, Guardian has proposed to compensate for all forested wetland impacts within the existing easement and temporary workspace corridor at a 0.5 to 1 ratio. Appropriate compensation would be determined by the Corps, in consultation with USEPA, FWS and DNR. Compensatory mitigation plans are pending at this time.

INVASIVE SPECIES AND DISEASE

Plants

Invasive plant species, for the purpose of this document, are non-native, undesirable native, or introduced species that are able to exclude and/or out-compete desired native vegetation, thereby decreasing overall species diversity. Vegetation removal and soil disturbance during construction could create optimal conditions for the establishment of invasive, non-native plant and noxious weed species. Invasive species are located throughout the proposed ROWs for the Guardian mainline and each lateral, however, the species, extent of coverage, phenology and habitat vary greatly.

The project applicants have included the potential invasive wetland plants in the plant species lists during wetland delineations. The presence and relative abundance of these plants has been recorded and would be used to assess the potential for spreading these invasive plants from wetlands containing a high abundance of invasive species to wetlands with low abundance or no invasive plant species.

Nuisance weeds such as purple loosestrife, or hybrids thereof, and multiflora rose are regulated under Chapter 23.235 of the Wisconsin Statutes. This regulation prohibits the sale, distribution, or cultivation of these species. Noxious weed regulations occur at Wisconsin Statute 66.0407 and define noxious weeds as Canada thistle, leafy spurge, and field bindweed and any other weed a governing body of a municipality or county board declares to be noxious within its respective jurisdiction.

The common invasive species that would likely be present along the route include (* indicates presence is identified in application):

Purple loosestrife (*Lythrum salicaria*)
Giant reed grass (*Phragmites australis*)
Common and glossy buckthorn (*Rhamnus cathartica* and *frangula*)
Reed canary grass (*Phalaris arundinacea*)*
Eurasian water milfoil (*Myriophyllum spicatum*)
Narrow-leaved cattail and hybrid cattail (*Typha angustifolia and Typha x glauca*)*
Autumn olive (*Elaeagnus umbellata*)
Japanese knotweed (*Polygonum cuspidatum*)
Black locust (*Robinia pseudoacacia*)
Honeysuckles (*Lonicera maackii, morrowii, tatarica*)
Spotted Knapweed (*Centaurea maculosa*)
Leafy spurge (*Euphorbia esula*)
Wild parsnip (*Pastinaca sativa*)
Japanese hedge parsley (*Torilis japonica*)
Garlic mustard (*Alliaria petiolata*)
Canada thistle (*Cirsium arvense*)

The majority of the wet meadow type wetlands along the proposed pipeline routes are dominated by or contain reed canary grass. The likelihood of reed canary grass remaining dominant following construction is high. The cattail and cattail hybrids are also widespread in the overall project area in wetlands with deeper water than those that are dominated by reed canary grass.

The Sheboygan River is the only waterway with a known population of Eurasian water milfoil. WPSC has proposed to cross the Sheboygan River with its Sheboygan lateral using an HDD installation method. Use of the HDD to install the proposed pipeline under the Sheboygan River would not require any construction equipment to enter the river, eliminating any potential to spread the milfoil to other waters.

The linear nature of pipeline construction can act as a vector for spreading invasive species. Mitigative measures against spreading the invasive species include avoiding the population, thereby limiting the spread of seeds and plant matter. Another method of mitigation is cleaning equipment after leaving an infested area and entering another area. Sequencing construction such that the infested areas are done last would reduce the transportation of seeds and plant matter to uninfested areas.

Invertebrates

Zebra mussels are becoming more widespread in the inland waters of Wisconsin and could potentially be spread by construction activities. Based on information provided by the DNR, none of the proposed pipeline projects would cross any known zebra mussel-infested waters.

Diseases

Oak wilt, a fatal tree disease that most often affects oak species in the red oak family, is caused by a fungus, *Ceratocystis fagacearum*. The fungus invades water-conducting vessels and induces the formation of balloon-like projections called tyloses which also plug the vessels. As water movement within the tree is slowed, the leaves wilt and drop off the tree. Removal or trimming of oak trees in spring, when the fungus produces spores, can enhance the spread of oak wilt disease. Oak wilt is known to occur in most eastern Wisconsin counties. Construction of the proposed gas pipelines could contribute to the further spread of oak wilt if cutting, pruning, or damage to oaks occurs. A variety of tree cutting and trimming practices have been developed to reduce the spread of oak wilt. WG and WEPCO have proposed following a set of practices, found in Wis. Admin. Code PSC 113.0511, used by the state's electric utilities. DNR's forest pathology staff helped to develop these practices with a focus on the specific needs of utility operations. Following these or similar practices when constructing the proposed gas pipelines would help reduce the potential to spread oak wilt.

GROUNDWATER, TRENCH DEWATERING AND SPILLS

The uppermost major aquifer in most of eastern Wisconsin is the sand and gravel aquifer, which consists of unconsolidated deposits of sand and gravel within the glacial drift that covers most of the state. Well yields within the sand and gravel aquifer generally range between 5 and 500 gallons per minute (gpm), but most are between 5 and 15 gpm. Well depths within the aquifer typically range from 20 to 200 feet, but most are less than 100 feet deep.

Sedimentary bedrock aquifers lie beneath the sand and gravel aquifer, starting with the Silurian age Niagara dolomite discussed previously. Deeper aquifers consist of Paleozoic-age sandstone and dolomite, these rock formations are able to produce enough water to be considered an aquifer. Well depths can range from 66 to 1100 feet with most wells around 230 feet deep.

Municipalities along the pipeline routes that obtain drinking water from groundwater sources would typically use wells extending into the lower bedrock aquifer. Most residences that are not connected to municipal water supplies probably obtain drinking water from private wells, some of which may tap the shallow sand and gravel aquifer. Since residences are located near each of the pipeline project routes, it is likely private wells are near the proposed routes.

While construction of pipelines could affect groundwater resources, the potential impact is generally considered to be minor due to the limited depth to which pipeline construction trenches are excavated. The shallow sand and gravel aquifer could experience localized impact from changes in overland water flow and recharge caused by clearing and grading of the construction ROW. In forested areas, enhanced water infiltration provided by a well-vegetated cover would be temporarily lost until vegetation is successfully reestablished. Near-surface soil compaction caused by heavy construction vehicles could also reduce the soil's ability to absorb water. This minor impact would be temporary and would not be expected to significantly affect groundwater resources.

Blasting may be required to excavate the pipeline trench in limited areas where bedrock is exposed or within trench depth of the ground surface. Blasting near groundwater wells may cause temporary changes in water level and turbidity. These effects can be minimized by the selection of proper blasting techniques, so that rock would only be fractured in the immediate area of the blast locations. Use of blasting to excavate a pipeline trench would be subject to federal, state and local laws, permits and authorizations. These approvals would likely include measures that control energy release during blasting, along with imposing safeguards to protect nearby persons and property. Specific locations where blasting might be necessary have not yet been identified. It is unlikely that groundwater quality and supply systems beyond the ROW would be affected by blasting.

Temporary dewatering of a pipeline trench may be required at certain times during construction when the accumulation of either groundwater or surface runoff restricts either visual inspection of the trench bottom before lowering in the pipe, or actual work in the trench. During trench dewatering, a hose is placed in the trench with the intake suspended above the bottom of the trench to avoid disturbing sediment. Water is then pumped from the trench and discharged to an upland area or dewatering structure. During well point dewatering, well points are driven into

the ground adjacent to the construction area. Groundwater is pumped through the well points, temporarily lowering the local water table and enabling work to occur below the natural water table level.

As previously discussed, pipeline trenches are anticipated to be approximately six feet deep, whereas most shallow residential wells range from 20 to 200 feet. At this depth, dewatering of surface runoff or ground water is not anticipated to cause a significant drawdown of nearby residential wells. Furthermore, trench dewatering is typically short-term and used only as necessary during certain construction activities. Consequently, well impacts resulting from construction dewatering are unlikely.

The potential impacts on users of unconfined, shallow aquifers depend on the rate and duration of pumping and the distance of the dewatering operation from the well itself. While high capacity wells (greater than 70 gallons per minute) are subject to DNR regulation under Ch. NR 812, Wis. Admin. Code, it is unlikely that dewatering would require use of high capacity wells.

At any one location, trench dewatering typically only continues for a few days, keeping potential impacts very localized and temporary. Typically, the impact of dewatering activities is reduced by discharging all water into well-vegetated upland areas or properly constructed dewatering structures, which allow the water to infiltrate back into the ground and return to the aquifer. Discharge of trench dewatering waters would be subject to Wisconsin Pollution Discharge Elimination System (WPDES) permits. The WPDES permits would regulate dewatering water discharge quality and how it must be handled to prevent scouring and erosion impacts. It is assumed, for this EA, that the WPDES permit requirements would adequately prevent adverse impacts to any surface or ground waters receiving the water discharged from trench dewatering.

Spills resulting from refueling of construction vehicles and storage of fuel, lubricants, and other fluids during construction could contaminate groundwater if not detected and cleaned up. Guardian, WG, WEPCO and WPSC have Spill Plans which describe measures to minimize the potential for spills, and outline procedures to contain, clean up, and report spills should they occur. Implementing the measures contained in the plans can effectively limit the impact of spills and ensure adequate clean up after a spill. Proper implementation of the plans should ensure that the impacts of any spills that occur during construction would be contained and minimized.

HYDROSTATIC TEST WATER

The construction of high-pressure pipelines includes testing the pipeline's integrity before it is used to carry natural gas. Testing involves filling sections of the pipeline with water at greater pressures than would be used when transporting natural gas. The pressure testing is generally referred to as hydrostatic testing. The test water is usually drawn from a nearby lake, stream, or other surface water. After the testing period, the test water is discharged into a nearby waterbody or on to an upland area.

Entrainment (pulling in) of fish and other aquatic organisms could occur during withdrawals of hydrostatic test water from the source waterbodies. There is a potential for stream scour if test

waters are directly discharged into waterbodies and the potential for erosion if the discharge occurs in upland areas. These impacts are generally controlled by the use of diffusers, filter bags and other energy-dissipating devices.

The specific sources of the hydrostatic test water and the specific discharge locations have not been determined. Discharge of hydrostatic test waters would be subject to WPDES permits, which would regulate test water discharge quality and how it must be managed to prevent scouring and erosion impacts. It is assumed, for this EA, that the WPDES permit requirements would adequately prevent adverse impacts to any surface or ground waters receiving the discharged test water.

FLOODPLAINS

Floodwater flows can scour stream channels, damage buildings and other structures located in floodplains or flood prone areas, and deposit sediments downstream. The presence of structures in these areas can also affect floodwater flow patterns and water-holding capacities of these areas. New underground facilities, such as buried natural gas pipelines, are not considered at risk from flood damage. Nor are new underground facilities likely to alter flood water flow patterns or change floodwater storage capacities.

The proposed pipeline projects are reviewed to determine whether any aboveground structures or equipment would be located in designated floodplains or other flood prone areas. No aboveground facilities are proposed in floodplains/flood prone areas for either the Guardian mainline or for any of the associated lateral pipeline projects.

HISTORIC RESOURCES

A review of records of the Wisconsin Historical Society was done to determine the potential of the lateral pipeline projects proposed by WG, WEPCO, and WPSC to affect known historic properties. Historic properties include archeological sites, historically significant buildings and other resources of historic value. In addition, additional field survey work by a qualified archeologist was done in an area where landowners indicated that they had collected Native American artifacts along the WPSC Sheboygan lateral route.

The potential of the WG, WPECO and WPSC lateral pipeline projects to affect historic properties is further discussed in the project specific sections of this EA.

Guardian provided information in its application to FERC on potential affects to historic resources. Under FERC application procedures, the Guardian information on historic properties is treated as sensitive information and is not available to the general public. It is anticipated that FERC would include a public review of the historic resource information in its Draft Environmental Impact Statement being prepared on the Guardian project. This EA cannot provide any information on the potential impacts of Guardian's proposed pipeline on historic resources.

EROSION CONTROL

Several pipeline construction procedures, including vegetation clearing, trenching, grading, and backfilling, can destabilize the soil surface and increase erosion. A soil's susceptibility to erosion results from its texture and structure, topography, surface roughness, vegetative cover, and the effects of weather and climate. Erosion may also be influenced by the length of time the soils are bare, by disruption of drainage patterns, and the presence of erosion control structures such as terraces. Water-caused erosion occurs primarily on loose soils on moderate to steep slopes, particularly during high intensity storm events. Wind-induced erosion often occurs on dry, fine, sandy soils where vegetation cover is sparse and strong winds are prevalent.

WG, WEPCO and WPSC have proposed erosion control plans that are based on DNR Storm Water Management Technical Standards for Construction Site Erosion and Sediment Control. These standards, based on current research, field experience, and the best available technology, specify the minimum requirements needed to plan, design, install and maintain a wide array of conservation practices aimed at preserving the land and water resources of Wisconsin. The technical standards are a primary component of many federal, state and local conservation programs. The DNR recommends the use of the standards or their equivalent for erosion/sediment control or storm water management, as they have been found to be adequate and effective.

Guardian has also proposed to follow a set of erosion and runoff control practices during construction of its proposed project. These practices are incorporated in its Upland Erosion Control, Revegetation, and Maintenance Plan and its Wetland and Waterbody Construction and Mitigation Procedures, which are included as part if its application to FERC. The construction practices proposed in Guardian's Plan and Procedures are similar to the practices in the DNR Technical Standards.

The overall potential for erosion and runoff associated with construction of the proposed gas pipeline projects should be minimal if the erosion control practices proposed by each of the project applicants are followed.

AGRICULTURE

Construction of large pipelines can damage or reduce the suitability of lands for agricultural uses. Substantial concerns included soil compaction, mixing of soil layers, disrupting drainage patterns, and increasing the density of rocks near the surface of the soil. These actions could result in reduced crop productivity or damage to farm equipment.

Soil compaction could result from the movement of heavy construction vehicles along the ROW. The degree of compaction would depend on the moisture content and texture of the soil. Compaction damages soil structure and reduces pore space, which impedes the movement of air and water to plant roots and can reduce growth rates. Clodding at shallow depths also complicates planting in agricultural areas. Potential for compaction is greatest where heavy equipment operates on moist to wet soils with high clay content.

Mixing soil horizons during grading, trenching, and backfilling could reduce soil productivity by diluting the favorable physical and chemical properties of the topsoil with the less productive subsoil. These activities also could bring stones to the surface that could interfere with agricultural equipment.

Improper construction activities could disrupt natural drainage or damage existing surface and subsurface drainage systems. Underground drainage tiles could be cut during trenching and shallow tiles outside of the trench area could be damaged or displaced by heavy equipment, particularly where soil grading or topsoil stripping has reduced the depth of soil between the drainage tiles and construction equipment. Drainage tiles could also be damaged outside of the trench line by ruts from the operation of heavy equipment in wet soils. Disruption of surface and subsurface drainage systems could cause temporary crop losses off the ROW. The pipeline, if not buried deep enough, could also interfere with the placement of future drainage tiles.

Inadequate compaction of trench backfill could cause subsidence of soil over the pipeline, altering field drainage and causing water to pond over the pipeline, delaying planting or killing crops. Severe subsidence could also interfere with the operation of agricultural equipment.

Construction may also expose soils that are difficult to revegetate because they are excessively drained and dry. Another soil impact would be the loss of prime farmland soil if surface facilities are constructed on prime farmland soils.

Guardian, WG, WEPCO and WPSC have all proposed construction practices to be used when constructing the proposed pipelines through agricultural lands. The proposed construction practices are based on experience with past pipeline construction projects and include practices to address all of the major impacts noted above. Implementing the proposed agricultural construction practices should greatly reduce or eliminate the major impacts associated with construction through farmlands.

GEOLOGIC RESOURCES AND HAZARDS

The landscape of the overall project area has been shaped by several glacial advances and retreats, which have produced a variety of erosional and depositional landforms. The predominant surficial geology of the area consists of Wisconsinian age (12,000 to 10,000 years ago) glacial deposits. These deposits comprise glacial moraine till, outwash and lacustrine deposits from 0 to 100 feet thick, but sometimes reaching depths of 400 feet or more.

The underlying bedrock layers are sedimentary formations of sandstone, limestone, dolomite, and shale. The proposed pipeline routes are generally not expected to encounter bedrock, due to the depth of the overlying surficial deposits.

The Niagara Escarpment is a prominent geologic feature in eastern Wisconsin. It is an extensive bedrock ridge curving westward from south of Rochester, New York, across southeast Canada, and then southward west of Lake Michigan to southeastern Wisconsin. The Niagara Formation (the dolomitic limestone layer itself) is typically covered by up to several hundred feet of unconsolidated glacial till along its length with isolated vertical outcrops and horizontal

exposures. The exposed faces of the escarpment provide habitat for many rare species and communities. Of the proposed pipeline projects, only the WPSC Denmark lateral crosses near exposed faces of the Escarpment in Section 23 of the town of Shirley, Brown County. There are no exposed faces of the Escarpment at the specific crossing location of this lateral, and the land use at that location is primarily farming, with no significant remnants of natural vegetation at the crossing point.

Exploitable non-metallic mineral resources occur in the counties crossed by the pipeline route. These are primarily crushed and dimension stone, sand and gravel, and lime. If any quarries, or potential quarries, are located near a pipeline route, the applicant would have to work with the affected landowners/operators to obtain an easement agreement that governs mining activities in the immediate vicinity of the permanent pipeline ROW and/or establishes an adequate buffer zone between active mining areas and the proposed pipeline. Compensation for any losses or limitations on mining operations (current or future expansion) should be addressed during those easement negotiations.

Eastern Wisconsin does not have any significant sites with exploitable deposits of metallic minerals. The last regional metallic mining operation (at the Neda Mine in Iron Ridge) ended in the early 20th Century.

Geologic hazards are not anticipated to be a significant factor in the construction, operation, or maintenance of the proposed pipelines. Seismicity is not a significant geologic hazard in Wisconsin. Only one earthquake with an intensity greater than V on the Modified Mercalli Scale has been recorded within the state. This was the 1909 Beloit event with an intensity of VII. Such an event would strongly shake trees and shrubs and would be noticeable to people driving cars, but would only cause minor damage to well-built structures. The integrity of the proposed pipelines should not be affected if such an event occurred nearby.

Ground failure due to slumping or landslides may pose a risk on the steeper slopes. Slope, soil conditions, and precipitation are known to be major factors in slope stability. The risk of slope failure is highest in situations where fine-textured soils occur on steep slopes with an inclination greater than 30%. Under these conditions, ground disturbance from construction may cause zones of weakness that can fail when soils become saturated. There are no known locations along the proposed pipeline routes where this concern should be a factor.

AIR QUALITY

Construction equipment used to install the pipeline projects would produce air pollutant emissions. In addition, there is a potential for periodic short-duration emissions if the emergency generator at Guardian's Bluff Creek compressor station in Walworth County is operating.

During construction, the primary emissions would be particulate matter, in the form of dust, from the mechanical disturbance of soil by construction equipment (fugitive emissions). On cultivated land, the volume of dust produced by construction equipment operations would be comparable to that produced by farm equipment.

The primary air pollutant emissions during construction would be dust, and would be minor and of short duration. As pipeline construction proceeds, equipment movement and site preparation would generate dust. The project applicants would implement mitigation measures to control fugitive dust emissions, such as spraying water on areas, such as dry, exposed soils or access roads, where winds could spread dust and other particulate matter. However, because construction would not occur in a single location for any significant length of time, the impact of these emissions at any single location would be minor.

It is expected that the exhaust emissions from construction vehicles and equipment would have an insignificant impact on the air quality of the region, since this equipment must meet current EPA standards for mobile sources, and would only be operating for limited hours each day, and for a short duration during construction. Emissions from construction are not expected to cause or significantly contribute to a violation of an ambient air quality standard because the construction equipment would be operated on an as-needed basis rather than continuously. Also equipment would be operated throughout the daylight hours, rather than concentrated during certain periods (like rush-hours) when construction equipment emissions could combine with those from other emissions sources, and possibly exceed a standard.

Because Guardian has proposed that the compressor at the Bluff Creek station would be electric motor-driven, the only source of air pollutants during operation would be the diesel fuel-fired emergency backup generators, if needed. However, because their operation would be limited to 500 hours per year, potential emissions from these units would also be limited. The estimates for emissions from the Bluff Creek station backup generators, assuming the maximum 500 hours per year of use, are 1.0 tons/year (tpy) for NO_2, 0.3 tpy for CO, 0.2 tpy for SO_2, 0.04 tpy for $PM_{10}/PM_{2.5}$, 0.04 tpy for VOC and negligible emissions of Pb. The maximum potential annual emissions for these units are well below major source emission thresholds.

COMMUNITY DISTURBANCE

The construction of the proposed gas pipelines could also create a nuisance disturbance. Noise and vibrations generated from construction equipment could be bothersome. These effects would generally be short-term and would end when construction is complete. The potential for construction disturbance would last for a longer period in the immediate vicinity of areas where extended construction activities would occur, primarily horizontal directional drill or jack and bore sites.

Traffic lane closures along some sections of the proposed route would occur during construction. These closures would generally be limited to the immediate vicinity of active construction. For any given location, the traffic disruption should last only a day or two. In two locations, however, closure of the entire road is likely. A short segment of the Fox Valley lateral would be located underneath the pavement of Maple Street in Kimberly. Most residents along this stretch of Maple Street appear to have access to the back of their properties from alleyways, which would reduce the potential disturbance of closing Maple Street. Other residential streets that may require closure are N. 9th and Cedar Streets in De Pere along the Southwest Green Bay lateral.

Chapter 3 - WG Harford/West Bend Lateral

The Hartford/West Bend lateral proposed by WG involves construction of two segments. The Hartford segment consists of about 10 miles of 12-inch diameter gas pipeline in Dodge and Washington Counties. This segment would connect the Guardian extension to the existing WG distribution system in the Hartford area. The second segment, the West Bend segment, consists of about four miles of 12-inch diameter gas line in Washington County to connect the existing distribution systems in Hartford and West Bend areas. These two segments of new pipeline are jointly referred to as the "Hartford/West Bend lateral." Figures 2 and 3 show the proposed routes.

The Hartford segment permanent easement would be 50 feet wide with an additional temporary easement of 50 feet, for a total of 100 feet. Portions of the Hartford segment would be reduced to 75 feet to minimize disturbance to environmentally sensitive areas such as wetlands, waterways, and forests. The West Bend segment would be built completely within the existing road ROW.

The proposed Harford segment is located in an area where the major land use is agriculture, with scattered low density residential areas. Small patches of woodlots and wetlands are present. The proposed route for the Hartford segment would require easements on private lands, with most of the route crossing through agricultural fields.

The proposed route for the West Bend segment is within the existing ROW of a county highway. The adjacent lands are a mixture of agricultural, residential and commercial development.

RARE SPECIES AND COMMUNITIES

Natural habitat is present along the Hartford segment of this lateral primarily where wetlands and waterways are crossed. The following natural community occurrences are recorded near the Hartford/West Bend lateral: northern wet forest, shrub-carr, southern mesic forest, southern tamarack swamp and calcareous fen.

About two acres of a southern mesic forest would be cleared in the vicinity of Woodland Creek. A 75 foot-wide ROW would be cleared of trees for construction. A 50-foot wide permanent ROW would be retained following construction, of which 30 feet over the pipe centerline would be kept free of trees to facilitate access and inspection of the pipeline. WG does not propose restoration or replacement of any forest tree losses. This forest is approximately 0.25 miles north of an NHI southern mesic forest natural community occurrence identified as Thomas Woodland. The wetland community that lies between Thomas Woodland and the affected woodland is a combination of sedge fen and shrub-carr with good species diversity. The value of them affected area is that it is contiguous with wetlands and other woodlands. Because of this it may provide more habitat resources for plants and animals than isolated wetlands or woodlots alone. The incremental losses of forest-wetland communities in this ecological landscape, while small, may still have an important cumulative effect. Other route options are being evaluated in this area which would avoid any impacts to this forested area, but it is not known if any of the route options would be authorized.

The NHI review for this lateral yielded three special concern plant species; one endangered and one special concern butterfly species; another special concern insect; two special concern snail species; and one threatened turtle. All of these species, with the exception of one of the plants, prefers moist (wetlands or wooded wetlands) or aquatic habitats. Most of these species also prefer alkaline conditions. WG completed field surveys during 2006 and did not observe any of these species. Suitable habitat for the rare turtle species may be present in the project area. Use of mitigation protocols developed by the DNR, including the use of exclusionary fencing, should adequately protect any turtles that might be present from pipeline construction. WG has indicated that it would follow these mitigation protocols where appropriate along the project route.

The West Bend segment of this lateral would be located in road ROW that is adjacent to agricultural and residential development. The NHI database identified floodplain forest and northern-wet mesic forest, but neither of these are proximate to the proposed lateral. On this segment the NHI database indicates that two special concern and one threatened fish species; one threatened turtle species; one threatened snake; one endangered and two special concern plant species may be present.

Habitat for the Blanding's turtle is unsuitable due to the lack of suitable vegetation cover and stream conditions. Habitat for the rare plant species is also unsuitable due to the lack of forest cover in the disturbed areas. One rare fish species may be present in Quas Creek. This crossing would be installed using HDD construction, which would avoid any direct disturbance to the waterway. As an additional protection measure, DNR staff has requested that the HDD work be scheduled outside the spawning season for rare fish species, which is generally from May 15 to the end of August.[3]

Potential impacts to the Butler's garter snake were also evaluated. Due to the size and quality of suitable Butler's garter snake habitat, the site was classified as a potential Tier 1 Site (Site of Minimal Conservation Value). As a result, the site is covered under the broad *Incidental Take Authorization for Tier 1 Butler's Garter Snake Sites.* Per the authorization, no conservation measures are required for the state-listed snake and any take that results from the proposed project would be covered. DNR staff has recommended that WG implement the voluntary conservation measures described within the conservation strategy to benefit the snake at this site.

SURFACE WATERS

Construction of the proposed Hartford segment pipeline in Dodge and Washington Counties would require nine waterbody crossings. Included are three crossings of named streams, one of Butler Creek and two of Woodland Creek. There would be up to seven crossings of unnamed, intermittent streams.

Construction of the proposed West Bend segment pipeline in Washington County would require four waterway crossings. There are two crossings of named streams, Evergreen Creek and Quas

[3] Note that this time period was intended to cover the spawning period of the rare fish species that may be present; many other fish have spawning periods that are earlier.

Creek; both are Areas of Special Natural Resource Interest due to the presence of aquatic Species of Concern. There are two crossings of unnamed, intermittent streams; one is tributary to Evergreen Creek and one is tributary to Quas Creek.

Information about fisheries was collected through contacts with DNR field personnel. The streams crossed by the Hartford segment are warm-water forage fisheries. Warm-water fisheries are warm-water streams/rivers which support fish; the smaller streams typically support a diverse community of forage fish, rather than sport fish. The spawning seasons for most warm-water fish species occur between April and the end of June.

The following table briefly describes the waterways along the proposed WG Hartford segment route and the proposed crossing construction method for each. Numbering is from west to east.

Hartford Stream #	Stream Name (UNT_1)	$Type_2$	Crossing $Method_3$	Road Location or milepost	Associated Wetland #
1	UNT to Hepp Cr.	Intermittent		@ State Rd. 67	
2	Woodland Creek trib to Wildcat Cr	Intermittent (with flow)	jack and bore	RR	Thomas H-14a
3	Woodland Creek	Intermittent (with flow)	HDD		Thomas H-14
4	UNT to Butler	Intermittent		E. of St. Johns Rd. ~2,000'	
5	UNT to Butler	Intermittent		E. of CTH P	Jankowski H-13b
6	UNT to Butler	Intermittent		E. of CTH P, W. of CTH NP	W. Klink Woods H-13h
7	UNT to Butler	Intermittent		W. of CTH NP	E. Klink Woods
8	Butler Creek tributary to Rubicon River	Perennial	HDD	E. & N of CTH NP	H-15
9	UNT to Butler	Intermittent		E. of Goodland Rd.	

[1] Unnamed tributary.

[2] Based on 7.5 minute USGS Topographic quad maps.

[3] HDD = Horizontal Directional Drill; Open trench (no flow) = trenching without any stream isolation or bypass, limited to times of no stream flow; Isolation Trenching = use of Dam and Pump or Dam and Flume crossing methods to isolate trench area from stream flow.

Both named streams crossed by the West Bend segment pipeline are Areas of Special Natural Resource interest. Potential impacts to in-stream organisms would be avoided by the chosen construction method and timing the crossing to avoid sensitive periods of the species' life cycles.

The following table briefly describes the waterways along the proposed WG West Bend segment lateral gas pipeline route and the proposed crossing construction method for each. Numbering begins at the south end of the route.

West Bend Stream #	Stream Name (UNT_1)	$Type_2$	Crossing $Method_3$	Road Location or milepost	Associated Wetland #
1	Evergreen Creek	Perennial		S. of CTH NN ~850'	WB-3
2	UNT to Evergreen	Intermittent		N. of CTH NN ~1600'	WB-4
3	Quas Creek	Perennial	HDD	S. of Paradise Rd. ~1600'	WB-8
4	UNT to Quas	Intermittent	HDD	N. of Paradise Rd. ~500'	WB-9

[1] Unnamed tributary.

[2] Based on 7.5 minute USGS Topographic quad maps.

[3] HDD = Horizontal Directional Drill; Open trench (no flow) = trenching without any stream isolation or bypass, limited to times of no stream flow; Isolation Trenching = use of Dam and Pump or Dam and Flume crossing methods to isolate trench area from stream flow.

The DNR Chapter 30 permit would dictate the construction method at each waterway. WG would conduct waterbody crossings in accordance with DNR-approved site-specific, typical or contingency plans. These plans generally include crossing method, timing of construction, erosion control measures, setbacks, additional temporary work space locations, in-stream sediment control where appropriate, equipment bridges where applicable, and substrate backfill specifications. Impacts on surface waters would be limited primarily to the period of construction and are dependent on the time, duration, and method of pipeline installation. The evaluation of potential impacts from crossing waterways using any of the open trench methods assumes that the DNR waterway permit would require use of appropriate erosion control practices along with the restoration of the streambed contours to preconstruction conditions. DNR's permit reviews would specify any additional requirements to protect water bodies and fisheries.

WG proposed open cut trenching through all waterways but one on the Hartford segment and through two waterways on the West Bend segment. The trench for the Hartford segment would be approximately six feet wide by six feet deep. The trench for the West Bend segment would be approximately four feet wide by five feet deep. Mitigative measures that would decrease the impacts to waterways include wet trenching in waterways only if they have no flow. If water flow is present, dry crossing techniques would be required, which would reduce the amount of sediment that enters the waterway. The use of dry crossing techniques should result in only minor, temporary impacts to the water quality of these streams.

One pipeline crossing of Woodland Creek on the Hartford Segment would occur using the jack and bore method. This stream crossing is incorporated with the underground bore of the railroad

bed, which the stream parallels. Successful boring beneath the waterway would eliminate the potential environmental effects of pipeline construction on the waterbody.

WG currently proposes to directionally drill two waterway crossings on the West Bend segment, Quas Creek and an unnamed tributary to Quas Creek. Directional drilling minimizes the environmental effects of pipeline construction on a waterbody by going beneath the stream and avoiding disturbance of the stream bed and banks.

WG modified its initial project proposal to include the use of HDD installation for the crossing of Butler Creek and an associated wetland and one of the crossings of Woodland Creek on the Hartford segment. The other Woodland Creek crossing would be done using a jack and bore installation method. Both waterways provide quality fish habitat. Both the HDD and jack and bore methods minimize potential environmental effects of pipeline construction on a waterbody by going beneath the stream and avoiding disturbance of the stream bed and banks.

WETLANDS

The Hartford segment of this lateral crosses 15 wetlands and the West Bend segment crosses 14. The construction footprint through wetlands located in agricultural or other open lands would be a total of 75 feet wide; 50 feet would be permanent easement along with 25 feet of temporary construction easement. The construction work space needed for the portions of the lateral that are within road ROWs varies depending on the size of pipeline, ROW space available and topography. The total area of wetland impact is 11.3 acres on the Hartford segment. Six wetlands include areas of shrub-carr vegetation, four are fresh wet meadows, two are hardwood swamps and five wetlands are farmed wetlands. The total area of wetland impact on the West Bend segment is 1.2 acres and is in the road right-of-way. Five wetlands on the West Bend segment are shallow marshes, six are fresh wet meadows, five are shrub-carrs and one is a sedge meadow.

Direct impacts to the trenched wetlands would include an approximate 6-foot wide trench and a 35-foot spoil pile adjacent to the trench.

The following tables identify the wetlands along the proposed Hartford/West Bend Lateral routes and the proposed crossing construction method for each. The wetland reference numbers correspond to the identification numbers used by WG in its application materials. Some differences exist between the application and subsequent data request responses. This EA uses the initial application data.

Wetland #	Wetland Type	Impact (acres)	Crossing Method *	Approximate Milepost Location
WB-1	Shallow Marsh	0.13	Open-cut trench	0.4
WB-2	Fresh wet meadow and shallow marsh	0.17	Open-cut trench	0.7
WB-3	Sedge Meadow	0.08	Open-cut trench	1.0
WB-4b	Fresh wet meadow	0.04	Open-cut trench	1.4
WB-5a	Shallow Marsh	0.03	Open-cut trench	2.3
WB-5b	Shrub-carr	0.01	Open-cut trench	2.2

WB-5c	Fresh wet meadow	0.12	Open-cut trench	2.2
WB-5d	Sedge Meadow	0.09	Open-cut trench	2.2
WB-5e	Shrub-carr	0.01	Open-cut trench	2.15
WB-6b	Shrub-carr	0	Open-cut trench	2.4
WB-7b	Fresh wet meadow and Shallow marsh	0.36	Open-cut trench	2.7
WB-7c	Shallow Marsh	0.05	Open-cut trench	2.6
WB-8b	Fresh wet meadow	0.03	Open-cut trench	2.8
WB-8c	Fresh wet meadow	0.04	Open-cut trench	2.85
H-10	Shrub-carr	0.27	Open-cut trench	1.8
H-11		0		
H-12		0.00		
H-13c		0.72	Open-cut trench	5.2
H-14	Fresh wet meadow	0.79	Open-cut trench	3
H-14a	Shrub-carr	0.29	Jack and Bore	3
H-15	Fresh wet meadow	0.35	Open-cut trench	6.2
H-16	Fresh wet meadow	0.22	Open-cut trench	9.5
H-17a,b,c	Fresh wet meadow & shrub-carr	0.38	Open-cut trench	1.1
H-18	Not determined	1.72	Open-cut trench	
H-19	Not determined	4.14	Open-cut trench	
H-20	Not determined	0.49	Open-cut trench	
H-21	Not determined	1.44	Open-cut trench	
H-22	Not determined	0.49	Open-cut trench	
	Total	12.46		

The majority of the wet meadow type wetlands along the project route are dominated by or contain reed canary grass. The likelihood of reed canary grass remaining dominant following construction is high. Two higher quality wetlands occur along the Hartford Segment, H-14 and H-15. The DNR recommended HDD for these wetlands and their associated waterways. WG modified its initial application to use HDD installation in these two locations.

Some wetlands that would be crossed by the proposed West Bend Segment lateral are adjacent to waterways classified as Areas of Special Natural Resource Interest. The adjacent waterways are Quas Creek and Evergreen Creek. Construction through WB-9 would be done using the HDD installation method and therefore surface of the wetlands would not be directly affected.

HISTORIC RESOURCES

The records of the WHS include two listed archeological sites that may be in the immediate vicinity of the route of the Hartford segment of pipeline. Both sites are identified as unknown prehistoric campsites/villages with only vague location information. The general locations of the two sites are active agricultural lands. It is not possible to identify any clear risk to these sites from construction of the proposed pipeline, given the overall lack of information about the sites. WG has proposed to have a qualified archeologist perform a Phase I site investigation along the pipeline route prior to construction. If remnants of either site are found during the Phase I

survey, methods would be developed to avoid impacts to the site or sites prior to construction and subject to further PSC approval.

There is also a European era cemetery site adjacent to the route of the West Bend segment of this pipeline. Existing records regarding the cemetery are contradictory, with conflicting comments on whether or not the cemetery's burials have been moved to another location. No surface features of the cemetery are present and the area is in agricultural production. WG has proposed to have a qualified archeologist perform a Phase I site investigation along the pipeline route prior to construction. If any remnants of the cemetery are found during the Phase I survey, WG has indicated it would relocate the gas pipeline to the other side of the road in this location.

No other known archeological or other historic resources were identified in the records of the WHS that appear to be at risk from construction of the proposed Hartford/West Bend lateral pipeline.

Chapter 4 – WG and WEPCO Fox Valley Lateral

The Fox Valley lateral consists of four segments. The overall project crosses from agricultural lands into an expanding urban area. The primary land cover in the project area is a mix of agriculture and urban development. Woodlands, wetlands, and other natural land covers are found in small and scattered patches. Figure 4 shows the proposed routes.

Segment 1 is a 20-inch pipe that runs west from the new Guardian pipeline to the intersection of CTH CE and STH 55. WG and WEPCO provided information on two route options for Segment 1. The north option is about 4 ¼ miles in length and the south option is about 5 ½ miles. The first 2 1/2 miles of the north option would be built on easements on private lands, crossing a combination of agricultural and residential lands. The remaining 1 3/4 miles would be built within existing road ROW. Approximately the first 4 miles of the south route option crosses agricultural lands and is located within an existing electric transmission line ROW. The remaining 1 ½ miles crosses agricultural lands that is being converted to residential and commercial developments.

Segment 2 is an 8-inch pipe that extends north for about 1 ¼ miles from CTH CE and STH 55 into Kaukauna. This segment follows an old railroad bed that parallels Kankapot Creek through a generally wooded area. The old railroad bed has been converted into a recreational trail. A large electric distribution line also follows this alignment.

Segment 3 consists of about 4.7 miles of 16-inch pipeline that would be built primarily within road ROW, passing through an area that is entirely urban development.

Segment 4 is a 13,500-foot 12-inch main located north of the Fox River, following railroad and road ROW through an area that is mixed residential and commercial developments.

RARE SPECIES AND COMMUNITIES

The proposed Fox Valley lateral would be built in an area that is primarily agricultural and urban in nature. The NHI indicates, however, that southern dry-mesic and northern mesic forest communities are present in the general area. In addition, three special concern and five threatened plant species, one special concern crustacean, one special concern bird species were also identified in the project area. The longest distance of natural habitat that would be crossed by the project is on Segment 2, which runs parallel to Kankapot Creek along a recreational trail and utility easement. Construction along this segment would occur in maintained ROW areas and there would not be any additional clearing of wooded areas.

The south option for Segment 1 (along the transmission line corridor) crosses a few small woodlots. The rare plant species identified by the NHI are unlikely to be present along this route option because of historical disturbance and the extensive overlapping of the gas line route with an existing electric line ROW. Overall the south route option crosses through or past more small wetland areas and woodlots than the north route option.

The bald eagle is present in the project area. Monitoring data from 2006 indicates active nests are more than ¼ mile from Segment 2, the closest location to the proposed project. Based on this, no impacts to nesting eagles are expected from construction of the proposed Fox Valley lateral. The nesting status of eagles in the area would be updated using 2007 monitoring data from the DNR prior to construction.

SURFACE WATERS

Construction of Segment 1 along WG and WEPCO's preferred north route option would require four to six waterway crossings, depending on the exact placement of the pipe trench. The only named and perennial stream is Kankapot Creek, a tributary to the Fox River. All other waterways are intermittent streams that eventually flow into Plum Creek. The south route option for Segment 1 would have up to eight waterway crossings. Three crossings are through perennial streams, one of which is Kankapot Creek. All waterways, both perennial and intermittent, are tributaries to Kankapot Creek, and all are warm-water streams, mainly forage fish communities.

Construction of Segment 2 would involve two crossings of Kankapot Creek. The pipeline would also parallel the stream for a distance of approximately ½ mile.

Segment 3 crosss a perennial stream named Garners Creek, three intermittent streams that are tributary to Garners Creek, and one intermittent stream, in a residential area, that is a tributary to the Fox River. This segment is within road ROW.

Finally, Segment 4 includes two crossings of intermittent streams that are tributary to an unnamed creek flowing to the Fox River. Segment 4 is within road ROW.

All waterways impacted by the pipeline construction are streams of the Lower Fox River Basin. None of the streams being crossed is designated as an Area of Special Natural Resource Interest; however the Fox River is an ASNRI and many of the streams are closely connected.

Information about fisheries was collected through contacts with DNR field personnel. The streams crossed by the Fox Valley lateral pipeline are warm-water fisheries. Warm-water fisheries are warm-water streams/rivers which support fish; the smaller streams typically support a diverse community of forage fish, rather than sport fish. The spawning season for most warm-water fish species occurs between April and the end of June. The water quality in the streams of this area has been generally affected by agriculture and is more recently affected by rapid urbanization.

The following table briefly describes the waterways along the proposed lateral gas pipeline route segments and the proposed crossing construction method for each. Numbering starts at the east end of the route.

Segment & Stream #	**Stream Name** (UNT_1)	**Type**[2]	**Road Location or milepost**	**Associated Wetland #**
$1NP_4$ - 1	UNT to Plum Cr.	Intermittent	~0.3mi. E of Powers Rd.	
1NP - 2	UNT to Plum Cr.	Intermittent	~0.1mi. W of Powers Rd.	
1NP - 3	UNT to Plum Cr.	Intermittent	~0.05 mi E of CTH GG	
1NP - 4	UNT to Plum Cr.	Intermittent	~0.1 mi. W of CTH GG	
1NP - 5	Kankapot Creek	Perennial	~0.5 mi W of Loderbauer Rd.	W4-11
$1SA_5$ - 1	UNT to Kankapot	Intermittent	~0.16 mi E of Brant St. John Rd.	
1SA – 2	UNT to Kankapot	Intermittent	~0.25 mi W of Brant St. John Rd.	
1SA - 3	UNT to Kankapot	Intermittent	~0.3 mi W of Brant St. John Rd.	
1SA - 4	UNT to Kankapot	Intermittent	~0.5 mi W of Brant St. John Rd.	
1SA – 5	Kankapot Creek	Perennial	~0.5 mi E of N. Harwood Rd.	
1SA – 6	UNT to Kankapot	Perennial	~0.3 mi W of N. Harwood Rd.	
1SA – 7	UNT to Kankapot	Perennial	~0.43 mi S of CTH KK	
1SA – 8	UNT to Kankapot	Intermittent	~0.3 mi N of CTH KK	
2 - 1	Kankapot Creek	Perennial	~0.4 mi N of CTH CE	
2 – 2	Kankapot Creek	Perennial	~0.6 mi N of CTH CE	
3 - 1	UNT to Garners Creek	Intermittent	~0.06 mi E of Debruin Rd.	
3 - 2	UNT to Garners Creek	Intermittent	~0.16 mi E of Red Tail & Buchanan Rds.	
3 – 3	UNT to Garners Creek	Intermittent	~0.3 mi E of CTH N along CTH CE	
3 – 4	Garners Creek	Perennial	0.03 mi E of CTH N along CTH CE	
3 – 5	UNT to Fox River	Intermittent	~0.26 mi N of CTH CE along Thelosen Dr.	
4 – 1	UNT to Fox	Intermittent	at CTH OO & CTH E	

	River			
4 – 2	UNT to Fox River	Intermittent	at Glendale Ave. & Sandra St.	

[1] Unnamed tributary.
[2] Based on 7.5 minute USGS Topographic quad maps.
[3] HDD = Horizontal Directional Drill; Open trench (no flow) = trenching without any stream isolation or bypass, limited to times of no stream flow; Isolation Trenching = use of Dam and Pump or Dam and Flume crossing methods to isolate trench area from stream flow.
[4] NP = Segment 1 Northern Preferred route.
[5] SA = Segment 1 Southern Alternate route.

The DNR Chapter 30 permit would specify the construction method at each waterway. WG and WEPCO would conduct waterbody crossings in accordance with DNR-approved site-specific, typical or contingency plans. These plans generally include the crossing method, timing of construction, erosion control measures, setbacks, additional temporary work space locations, in-stream sediment control where appropriate, equipment bridges where applicable, and substrate backfill specifications. Impacts on surface waters would be limited primarily to the period of construction and are dependent on the time, duration, and method of pipeline installation. The evaluation of potential impacts from crossing waterways using any of the open trench methods assumes that the DNR waterway permit would require use of appropriate erosion control practices, along with the restoration of the streambed contours to preconstruction conditions. DNR's permit reviews would specify any additional requirements to protect water bodies and fisheries.

WG and WEPCO proposed open cut trenching through all waterways. The trench would be approximately six feet wide by six feet deep for Segment 1. Trenches along both Segment 2 and Segment 4 would be approximately four feet wide by five feet deep and the Segment 3 trench size would be approximately five feet wide by five feet deep. Mitigative measures that would decrease the impacts to waterways include wet trenching in waterways only if they have no flow. If flow is present, dry crossing techniques would be required, which would decrease the amount of sediment that enters the waterway.

Following installation of the pipeline, the trench would be backfilled. Disturbed areas within the floodplains would be restored to the extent practicable to original ground elevations, and would be stabilized and reseeded with approved seed mixes. WG and WEPCO would also be required to restore the preexisting slope, profile and substrate of stream bottoms in order to return the streams to pre-construction habitat values and hydrological functions. Pre- and post-construction streambed surveys would be required to assure all streams are restored to original conditions. The pre- and post-construction streambed surveys of each crossing are the best means of ensuring that the original stream morphology is restored and maintained after covering the pipeline. Long-term monitoring would be required to assure stream bed and bank recovery; follow-up restoration would be conducted, as needed. The use of dry crossing techniques should result in only minor, temporary impacts to the water quality of these streams.

WETLANDS

The proposed Fox Valley lateral crosses 21 wetlands when using the north route option for Segment 1 and 25 wetlands when following the south route option for Segment 1. The construction footprint through wetlands located in agricultural or other open lands would be 75 feet wide, with 50 feet as permanent easement, along with 25 feet of temporary construction easement. The construction work space needed for the portions of the lateral that are within road ROWs varies depending on the size of pipeline, ROW space available and topography. The total area of wetland affected by construction work space is 1.7 acres if using the north route option or 2.4 acres if using the south route option. The common segments of the routes, which generally are within road ROW (Segments 2, 3 and 4) cross wetlands that extend into the road ROW, including five fresh wet meadows, three sedge meadows, nine shallow marshes, one shrub-carr, and one hardwood swamp. Along the north route option for Segment 1, one wetland is a fresh wet meadow and one is a farmed wetland that was not delineated. Along the south route option are three sedge meadows and three undelineated farmed wetlands.

Direct impacts to the trenched wetlands would include an approximate 6-foot wide trench and a 35-foot spoil pile adjacent to the trench.

The following table identifies the wetlands along the proposed Fox Valley Lateral routes and the proposed crossing construction method for each. The wetland reference numbers correspond to the identification numbers use by WG and WEPCO in the application materials. Milepost locations were not provided by the applicant and have been estimated from aerial photos.

Wetland #	Wetland Type	Impact (acres)	Crossing Method *	Approximate Milepost Location
W1-1 (N)	Fresh wet meadow	0.00	Open-cut trench	0.7
W1-2 (N)	Farmed, not field delineated	0.53	Open-cut trench	
W2-2(S)	Sedge meadow	0.03	Open-cut trench	2.1
W2-3(S)	Sedge meadow	0.00	Open-cut trench	2.1
W2-4(S)	Sedge meadow	0.00	Open-cut trench	2.0
W2-5(S)	Farmed, not field delineated	0.23	Open-cut trench	
W2-6(S)	Farmed, not field delineated	0.30	Open-cut trench	
W2-7(S)	Farmed, not field delineated	0.71	Open-cut trench	
W3-1	Shrub-carr	0.15	Open-cut trench	
W3-2	Shallow marsh	0.04	Open-cut trench	
W4-01	Fresh wet meadow	0.02	Open-cut trench	1.7
W4-02	Shallow Marsh	0.02	Open-cut trench	2.4
W4-03	Hardwood swamp	0.05	Open-cut trench	2.4
W4-04	Shallow marsh	0.01	Open-cut trench	2.6
W4-05	Sedge meadow	0.01	Open-cut trench	2.8
W4-06	Fresh wet meadow	0.01	Open-cut trench	2.9
W4-07	Fresh wet meadow	0.01	Open-cut trench	3.3
W4-08	Shallow marsh	0.21	Open-cut trench	3.8
W4-09	Shallow marsh	0.28	Open-cut trench	3.9

W4-10	Shallow marsh	0.01	Open-cut trench	4.3
W4-11	Fresh wet meadow	0.09	Open-cut trench	4.5
W4-12	Shallow marsh	0.01	Open-cut trench	
W4-13	Shallow marsh	0.05	Open-cut trench	
W4-14	Shallow marsh	0.06	Open-cut trench	
W5-1	Sedge meadow	0.06	Open-cut trench	0.9
W5-2	Sedge meadow	0.04	Open-cut trench	0.3
W5-3	Fresh wet meadow	0.00	Open-cut trench	1.2
	Total Using North Segment 1 Option	1.66		
	Total Using South Segment 1 Option	2.40		

HISTORIC RESOURCES

The records of the WHS include two listed archeological sites that may be in the immediate vicinity of the route of the Fox Valley lateral pipeline. Both sites are located along Segment 4, north of the Fox River. Both sites are identified as Native American villages and lack precise locational or other site information. The general locations of the two sites have been heavily modified by residential and commercial developments. It is not possible to identify any clear risk to these sites from construction of the proposed pipeline, given the overall lack of information about the sites. WG and WEPCO have proposed to have a qualified archeologist perform a Phase I site investigation along the pipeline route prior to construction. If remnants of either site are found during the Phase I survey, methods would be developed to avoid impacts to the site or sites prior to construction and subject to further PSC approval.

No other known archeological or other historic resources that appear to be at risk from construction of the proposed Fox Valley lateral pipeline were identified in the records of the WHS.

Chapter 5 - WPSC Sheboygan Lateral

The Sheboygan lateral proposed by WPSC involves construction of about 33 miles of 16-, 14-, and 12-inch pipeline in Fond du Lac and Sheboygan Counties. This lateral would connect the Guardian extension with WPSC's existing distribution systems in the Plymouth and Sheboygan areas. Figure 5 is a general map of this lateral.

Most of the proposed route for the Sheboygan lateral would be adjacent to existing linear features. The ROW for this lateral is within an existing electric transmission line ROW for about 23 miles, adjacent to an existing natural gas line ROW for about three miles and next to a state highway for six miles. About one mile would be located along a fence line or a town road.

The Sheboygan lateral would pass through a large geographic feature known as the Kettle Moraine. This is an area with heavy deposits of uneven glacial till and much of the area is forested. The State of Wisconsin owns large blocks of this forest land and manages it as part of the Kettle Moraine State Forest (KMSF). The proposed gas pipeline would be located within an existing electric transmission line ROW when crossing the Kettle Moraine State Forest. The remainder of the proposed lateral route crosses lands where the major land use is agriculture, with scattered low density residential areas. Woodlots and wetland areas are generally small and scattered.

RARE SPECIES AND COMMUNITIES

The NHI database search for this lateral yielded a large number of occurrences. Specific impacts and proposed mitigation measures by general taxonomic group are described below.

Several natural community types are identified in the project area: emergent marsh, shrub-carr, and northern wet, southern dry-mesic, wet-mesic and mesic forests. This lateral encompasses relatively more natural habitat than the other laterals and, because it includes the Northern Unit of the KMSF, the area has been more intensively surveyed. Outside the KMSF, some woodlots are crossed by the proposed route, as well as some natural habitats associated with the Onion River (including lands included in the Onion River stream bank restoration area), the Mullet River and Ben Nutt Creek. Through all of these areas, however, the proposed gas pipeline would be located within an existing electric transmission line ROW.

WPSC estimates that it would not have to clear any trees within the portion of the ROW that crosses the KMSF. The transmission line ROW that would be shared by the lateral pipeline within the KMSF is quite brushy, but the "brush" is composed primarily of native species. Weeds are present, but are not as dominant as in typical ROWs. In its present state, this corridor supports a number of native plants that do not occur in adjacent forested habitats. During construction, the entire ROW would be cleared of vegetation and thereafter, the ROW would continue to be maintained for the transmission line, but in addition a 4-foot wide pathway over the pipeline would be periodically cleared of shrubs to facilitate inspection of the pipeline.

North of the proposed shared ROW, the forest is dominated by mature oaks. The forest south of the ROW supports more pockets of aspen, some small openings, feathered edges, stands of younger forest, and nearby old fields. The forest in this area supports at least four state-threatened species. The high value of this forest is that it can be managed as a relatively large block, one of the few remaining in this ecoregion of the state that can support populations of rare forest birds. Given the significance of the KMSF as wildlife habitat, DNR staff will recommend replacement of mature trees which are slow-growing and do not regenerate well that are cut down for construction. Moreover, since the value of this ROW comes from the dominance of native species, controlling invasive species within the ROW to ensure reestablishment of native species would be important. The DNR is expected to require WPSC to provide a plan for monitoring and controlling invasive species within the ROW after construction as an easement condition.

Reptiles

Occurrences for the Butler's garter snake, listed as threatened in Wisconsin, have been recorded in the project area. The project area is outside of this species' general range. It is possible that the snake may have been introduced to the area. However, the DNR completed an evaluation of potential impacts consistent with the Butler's garter snake conservation strategy and concluded that the construction of the lateral was a temporary disturbance affecting less than 20% of the contiguous suitable habitat and therefore this action would fall under the broad *Incidental Take Authorization for Temporary Habitat Disturbance for the Butler's Garter Snake* authorized on August 3, 2004.[4] DNR staff has recommended that WPSC implement the voluntary conservation measures described within the conservation strategy to benefit the snake at this site.

Occurrences of the Blanding's turtle (state threatened) and the queen snake (state endangered) have also been recorded in the project area. Additional assessment of habitat conditions for both species would be undertaken with the DNR to determine measures to avoid impacts to these species, either through constructing the pipeline during the species' inactive periods and/or the installation of exclusion fencing to ensure that individuals do not enter the construction area.

Fish

Two state-listed fish species may be present within the project area; however, both were identified in waterways that are not affected by the project.

Mussels and other invertebrates

Two state-listed mussel species and two special concern crustaceans may be present within the project area.

The waterway that supports the mussel species would be directionally bored. In the event of a frac-out, WPSC would implement its proposed contingency measures to stop drilling and contain and recover the drilling mud.

[4] For more information refer to: (http://dnr.wi.gov/org/land/er/take/TempHab.htm).

The two crustacean species occurrences were recorded in waterways that are not affected by the project.

Birds

Based on NHI records and some surveys completed within the KMSF, at least four state-listed, and two special concern bird species are present within the project area. All of the state-listed species prefer forested habitat for nesting and or foraging. Therefore, there is no concern that they would be nesting within the ROW that passes through the KMSF, which is dominated by shrubs and herbaceous plants. However, a concern remains that construction activities within the ROW during the nesting season could result in avoidance of suitable nesting habitat adjacent to the ROW or nest abandonment. It is estimated that construction activities may influence bird behavior up to 2,000 feet into the forest adjacent to the ROW, based on the size of the species' territories. If birds avoid these adjacent areas, it is possible some portion of the population using this area would not be able to successfully nest and/or raise young during the 2008 season. If active nests are abandoned, construction of this project may result in an incidental take subject to the Wisconsin Endangered Species Law. The DNR has identified the areas of concern within the KMSF and is working with WPSC to complete nesting surveys in areas adjacent to the ROW to determine the extent to which timing restrictions would be applied to activities in the KMSF, potentially from March 1 to August 31. This timing restriction could be adjusted depending on the species, results of the surveys, species tolerance to pre-existing human conditions, and nest locations along the KMSF segment.

Two state special concern species, the northern harrier (*Circus cyaneus*) and the great-blue heron (*Ardea herodias*) occur in other locations along the lateral route. The northern harrier prefers to nest in retired cropland (timothy/quackgrass), old field habitat, sedge meadow, and restored prairies. The breeding season extends from early April through late August. Northern harriers are distributed throughout the state; however, the construction disturbance would not result in a permanent loss of habitat and the impact would be temporary and is unlikely to be significant.

There is a small great blue heron rookery near one of the stream crossings for this lateral. The size and history of this rookery is unknown. The ROW where clearing would occur is approximately 400 to 500 feet from the rookery. The main disturbance would likely be from horizontal directional drilling equipment that would be set up several hundred feet further away. Herons are sensitive to disturbance during nesting, but the sensitivity in terms of the nature of the disturbance and distance to the rookery is unknown in this case. The DNR generally recommends that construction within 1,000 feet of heron nests should be avoided from mid-April to mid-July. At this site, it is likely that the boring would occur during this time period and would take approximately two weeks; however, the distance from the nests to the major boring disturbance may be sufficient so as not to disturb nesting herons. If this project is approved, the DNR has asked WPSC to document the heron activity in the spring prior to construction in the area to confirm whether herons are indeed nesting at the site and if so, to document the activity as construction continues.

Plants

There are 6 state-listed and 9 special concern plant species identified in the NHI that are known to occur within the project area for this lateral. They are described in the following table.

Rare Plant Species near the Sheboygan Lateral Project Area

Name	State Status *	Notes
seaside crowfoot (*Ranunculus cymbalaria*)	THR	This species is often found in brackish or alkaline places: sandy or muddy shores and marshes, ditches and harbors along Lake Michigan, even salted roadsides near the city of Superior.
Cooper's milkvetch **(***Astragalus neglectus*)	END	This species prefers riverbanks, ravines, lakeshores, and also old fields, and is often found on dolomite near Lake Michigan.
forked aster (*Aster furcatus*)	THR	This species prefers dry to mesic hardwoods, and is often found on streamsides or slopes with dolomite near the surface.
yellow gentian (*Gentiana alba*)	THR	This species has been observed in thin soil in dry, open woodlands, ridges and bluffs (often with dolomite near the surface), moist sand prairies and roadside ditches, and clay soils of wooded ravines.
marsh valerian (threatened) (*Valeriana sitchensis* ssp *uliginosa*)	THR	The species prefers calcareous coniferous swamps, often openings in northern wet forests.
small skullcap (*Scutellaria parvula* var. *parvula*)	END	The species prefers dry, often dolomitic cliffs and prairies.
American sea rocket (*Cakile edentula*)	SC	This plant is found on Lake Michigan beaches, and less commonly on dunes.
northern yellow lady's slipper (*Cypripedium parviflorum* var. *makasin*)	SC	This species prefers fens, calcareous swales, and rich springy forest edges.
tufted hairgrass (*Deschampsia cespitosa)*	SC	This plant prefers fens, sandstone and dolomite splash pools on the Great Lakes, springs, marly bog pools, and cedar swamps.
many-headed sedge (*Carex sychnocephala*)	SC	This plant prefers the muddy, sandy, marly, and peaty shorelines of lakes and ponds.
showy lady's slipper (*Cypripedium reginae*)	SC	This species prefers neutral to alkaline forested wetlands, rich upland forests in seeps, and moist to dry clay bluffs.
yellow evening primrose (*Calylophus serrulatus*)	SC	This species prefers steep bluff prairies along the Mississippi and lower St. Croix Rivers, cedar glades, and occasionally moister prairies.
marbleseed (*Onosmodium molle*)	SC	This species prefers dry prairies and woodlands. Blooming occurs throughout the month of July.
hairy beard tongue (*Penstemon hirsutus*)	SC	This species prefers dry gravelly and sandy prairies, or hillside oak woodlands, and can be found naturalized on roadsides.
fragrant sumac (*Rhus aromatica*)	SC	This plant has been found in woodlands with dolomite, or less commonly, sandstone, near the surface.

* END = State Endangered; THR = State Threatened; SC = State Special Concern

Of these species, the American sea rocket, seaside crowfoot and Cooper's milkvetch, are associated with alkaline lake shores and Lake Michigan coastal habitat that would not be affected by the project. Most of the remaining species are associated with wet or dry prairies and dry woodlands, which are generally not present within the project ROW. Much of the proposed ROW has been periodically mowed because it overlaps a maintained transmission line or road ROW, but ROW maintenance in itself does not preclude a species' presence if suitable habitat is present. Surveys for the yellow gentian (state-threatened) and the forked aster (state-threatened) were completed within the KMSF segment of the project ROW and these species were not found. Additional surveys for marsh valerian (state-threatened) would be completed in any potentially suitable habitat within the KMSF during June and July 2007 prior to construction. If this species is found, the area would be marked off and avoided or the impact would be minimized by other means, such as by use of wetland matting.

KETTLE MORAINE STATE FOREST

Approximately 3 ½ miles of the proposed Sheboygan lateral route crosses lands of the KMSF, which is managed by the DNR. Construction of the proposed gas pipeline would require minimal clearing of trees on KMSF lands. Most of the project route through the KMSF follows an existing 345 kV electric transmission line ROW. The existing ROW is cleared of trees for a width of about 150 feet; it is within this area that construction of the proposed gas pipeline would occur. The remaining vegetation in the existing ROW would have to be removed to allow construction of the proposed pipeline.

Two short segments of the proposed gas line route on KMSF lands deviate from the existing electric line ROW. The proposed route moves off the electric line ROW in the vicinity of Watercress Creek to reduce potential impacts to the creek. More information on the proposed crossing of Watercress Creek can be found in the Surface Waters section of this Chapter. Another short segment, about one mile east of Watercress Creek, deviates slightly from the existing ROW to avoid a wetland.

Staff of the KMSF met with WPSC, PSC, and other DNR staff during pre-application meetings on the proposed project. In those discussions, the KMSF staff indicated that construction of the gas pipeline within the ROW of the existing 345 kV electric transmission line would not result in any significant concerns regarding the use or management of the KMSF.

The principal impacts associated with construction through the KMSF would be the short-term disturbance of the ROW. The construction zone would be stripped of vegetation, which is a combination of shrubs and herbaceous plants, and the trench would be excavated. This removal of vegetation and the ground disturbance needed to construct the pipeline would create conditions that could lead to increased runoff and soil erosion. As discussed in the Erosion Control section of Chapter 2, implementing WPSC's proposed construction and erosion control practices should effectively control runoff and soil erosion.

Following pipeline construction, the pipeline construction zone is expected to revert back to a mixture of shrubs and herbaceous vegetation, similar to the vegetative cover previously

maintained for the electric line corridor. In the long-term, the vegetative cover over the gas pipeline construction zone should be no different from that which is currently maintained in the existing electric line ROW. An area about 4 feet wide and centered over the pipeline, however, may be mowed more frequently than the rest of the ROW to facilitate the required periodic inspections of the pipeline.

The gas pipeline route through the KMSF crosses the Ice Age Trail and other recreational trails. Construction of the proposed pipeline would likely close portions of these trails for short periods of time. WPSC has indicated that it would develop temporary alternate trail routes around the construction zone wherever possible. No estimate has been made of the number of people who would temporarily lose a recreational opportunity has been made. In the long-term, the proposed gas pipeline would not change the visual impact of the existing utility corridor for users of the recreational trails.

The KMSF supports the largest forested habitat area remaining in Sheboygan County and supports several rare species, including birds and reptiles. Potential impacts to these species are further discussed under the Rare Species and Communities section of this Chapter.

SURFACE WATERS

The proposed WPSC Sheboygan lateral gas pipeline route involves 20 waterway crossings. A DNR Chapter 30 permit would also be needed for surface grading near the Onion River, which would not be crossed by the proposed pipeline. WPSC evaluated each water crossing and developed an initial construction crossing method for each. The initial crossing method took into account stream width and depth, flow rates, adjacent topography, vegetation, and cost of the possible crossing methods. WPSC representatives later visited some crossing locations with DNR and PSC review staff to further evaluate possible crossing methods. Further consideration was given to special resources present (including threatened, endangered and special concern species), other physical constraints and limitations (such as concrete bridge footings), and seasonal flow patterns at specific crossings. A final set of proposed crossing methods was developed from the joint discussions between WPSC, DNR and PSC representatives. The water crossing methods and construction mitigation methods proposed by WPSC are detailed in the permit application filed by WPSC with the DNR, as well as in information in WPSC's application to the PSC.

The following table identifies the waterways along the proposed Sheboygan lateral route and the proposed crossing construction method for each.

Stream #	Stream Name (1)	Type (2)	Crossing Method (3)	Approximate Milepost Location	Associated Wetland
1	UNT Sheboygan River	Intermittent	Isolation Trenching	1.25	1
2	UNT Sheboygan River	Intermittent	Isolation Trenching	2.86	4
3	UNT Sheboygan River	Intermittent	Isolation Trenching	4.23	5

4	Sheboygan River		Isolation Trenching	4.97	6
5	UNT Mullet Lake	Intermittent	Isolation Trenching	7.99	9
6	Watercress Creek	Perennial	HDD	11.14	12
7	UNT Watercress Creek	Intermittent	Isolation Trenching	12.14	14
8	UNT Watercress Creek	Intermittent	Isolation Trenching	12.29	14
9	Watercress Creek	Perennial	Isolation Trenching	12.31	14
10	Watercress Creek	Perennial	Isolation Trenching	12.41	15
11	Ben Nutt Creek	Perennial	Isolation Trenching	18.36	21
12	UNT Onion River	Intermittent	Isolation Trenching	19.14	23
13	Mullet River	Perennial	HDD	24.32	27
14	N. Branch Mullet River	Perennial	HDD	25.11	29
15	UNT Sheboygan River	Intermittent	HDD	25.74	30
16	UNT Sheboygan River	Intermittent	Isolation Trenching	26.77	32
17	Sheboygan River	Perennial	HDD	28.34	33
18	UNT Sheboygan River	Intermittent	Isolation Trenching	28.72	34
19	UNT Willow Creek	Intermittent	Isolation Trenching	32.62	36
20	Willow Creek	Perennial	Isolation Trenching	32.82	37

(1) "UNT" = unnamed tributary to

(2) Based on 7.5 minute USGS Topographic quad maps.

(3) "HDD" = Horizontal Directional Drill; "Open Trench (no flow)" = trenching without any stream isolation or bypass, limited to times of no stream flow; "Isolation Trenching" = use of Dam and Pump or Flume crossing methods to isolate trench area from stream flow.

Watercress Creek is a designated Class II trout water, and Ben Nutt Creek is a Class II trout water and Exceptional Resource Water. The DNR reviews proposals affecting trout waters to ensure that the project would not directly affect spawning activity, or critical habitat such as spawning beds, pools, or riffles.

WPSC proposes to install the pipeline using HDD for six of the waterways. No changes to the bed of these waterways or their water quality would be expected to result from the pipeline installation if the HDD crossing method is successful.

WPSC proposes to install the pipeline using open-cut trenching for all intermittent streams that have no flowing water. Crossing these intermittent streams during no-flow periods with open cut trenching would not be expected to alter the streams' water quality, streambed configuration, or flow characteristics. Using this installation technique allows the crossing to be completed in the shortest timeframe.

If a stream has flowing water, WPSC would utilize the dam and flume technique, or the dam and pump technique. WPSC has stated that if there is water flowing at the time of construction, a temporary sandbag cofferdam and pump or flume would be placed in the stream in order to isolate the work area.

The evaluation of potential impacts from crossing waterways using any of these open trench methods assumes that the DNR waterway permit would require use of appropriate erosion control practices along with restoration of the streambed contours to preconstruction conditions.

WETLANDS

The proposed WPSC Sheboygan lateral gas pipeline route involves 36 wetland crossings. The construction footprint in wetlands would be 75 feet consisting of 50 feet of permanent easement and 25 feet of temporary construction easement. The total area of wetlands within the construction zone is 22.3 (0.9 acres forested, 17.5 scrub/shrub and 3.9 acres emergent). Construction through eight of the 37 wetlands, totaling 2,590 feet, would use HDD installation and therefore would not directly affect the surface of the wetlands.

Impacts in the trenched wetlands would include an approximate 6-foot wide trench and a 35-foot wide spoil pile adjacent to the trench.

The following table identifies the wetlands along the proposed Sheboygan lateral route and the proposed crossing construction method for each. The wetland and stream reference numbers correspond to the identification numbers used by WPSC in its application materials.

Wetland #	Wetland Type	Crossing Method *	Approximate Milepost Location	Associated Stream
1	Wet meadow	HDD	1	
2	Deciduous forested and wet meadow	Open Trench	2	
3	Deciduous forested and scrub/shrub	Open Trench	2	1
4	Wet meadow	Open Trench	3	2
5	Wet meadow and scrub/shrub	Avoided	4	3
6	Wet meadow and scrub/shrub	Open Trench	5	
7	Wet meadow and scrub/shrub	Open Trench	5	
8	Deciduous forested, scrub/shrub, wet	Open Trench	7	

	meadow			
9	Wet meadow and scrub/shrub	HDD	8	5
10	Wet meadow and scrub/shrub	Open Trench	8	
11	Wet meadow and scrub/shrub	Open Trench	8	
12	Wet meadow, shallow marsh scrub/shrub	HDD	11	6
13	Wet meadow and scrub/shrub	Open Trench	12	
14	Deciduous forested, scrub/shrub, wet meadow	Open Trench	12	7, 8, 9
15	Wet meadow	Open Trench	12	10
16	Wet meadow and scrub/shrub	Avoided	12	
17	Wet meadow and scrub/shrub	Open Trench	13	
18	Wet meadow	Open Trench	15	
19	Wet meadow	Open Trench	17	
20	Wet meadow	HDD	17	
21	Wet meadow and scrub/shrub	Open Trench	18	11
22	Wet meadow	Open Trench	19	
23	Wet meadow	Open Trench	19	12
24	Wet meadow	HDD	20	
25	Wet meadow	Open Trench	20	
26	Wet meadow	Open Trench	24	
27	Deciduous forested and wet meadow	HDD	24	14
28	Deciduous forested and scrub/shrub	Open Trench	24	
29	Wet meadow	Open Trench	25	15
30	Wet meadow	Open Trench	26	16
31	Wet meadow	Avoided	27	
32	Wet meadow	Open Trench	27	17
33	Wet meadow	Open Trench	28	18
34	Wet meadow	Open Trench	29	19
35	Wet meadow	HDD	30	
36	Wet meadow and scrub/shrub	Open Trench	33	20
37	Wet meadow	Open Trench	33	21

The majority of the wet meadow type wetlands along the project route are dominated by or contain reed canary grass. The likelihood of reed canary grass remaining dominant following construction is high.

Wetlands number 1, 9, 12, 20, 24, 27 and 35 would not be impacted from the direct installation of the pipe due to the use of HDD methods. However, these wetlands may be impacted by

clearing trees or shrubs from the ROW. Some of the area currently with tree or shrub cover would be kept permanently clear to allow access and inspection of the pipeline. This would be a change in the functional values of these wetlands.

Three of the wetlands that would be crossed by the proposed Sheboygan lateral are adjacent to waterways classified as Areas of Special Natural Resource Interest. The adjacent waterways, Watercress and Ben Nutt Creeks, are trout streams. Wetland 15 is associated with the crossing of Watercress Creek near MP 12.3. It is dominated by reed canary grass, Joe pye-weed, redstem aster, gray dogwood, and meadowsweet. Wetland 21 is associated with Ben Nutt Creek, and is dominated by reed canary grass, Joe pye-weed, silky dogwood, and sandbar willow. WPSC proposes using HDD under Watercress Creek and the adjacent wetlands. The crossing of Ben Nutt Creek would be trenched using an isolation crossing method.

No other wetland areas were identified through which construction of the proposed Sheboygan lateral would result in any unusual or major impacts to the wetlands.

HISTORIC RESOURCES

The records of the WHS indicate a European era cemetery, the Empire Cemetery, adjacent to the route of the proposed Sheboygan lateral. This cemetery is adjacent to the 345 kV electric transmission line corridor, that the proposed gas line route shares. The proposed location of the gas line would place it on the opposite side of the electric line structures from the cemetery. It appears there is adequate distance between the proposed gas line trench location and the edge of the cemetery to ensure that no disturbance would occur to the cemetery.

WPSC was informed by landowners along the route of a potential non-recorded site in the vicinity of Mullet Lake. WPSC had a Phase I archaeological survey done in the area noted by the landowners as containing Native American artifacts. The Phase I surveys confirmed the potential for undisturbed archeological resources to exist in the area. WPSC has proposed that further Phase I/Phase II evaluation plans for the area be completed prior to construction. WPSC has committed to either modify the route of the pipeline in this area to avoid the archeological site based on this further survey work, or, if avoidance is not possible, to develop a recovery plan for the archeological site impacted by the pipeline trench area.

No other known archeological or other historic resources that appear to be at risk from construction of the proposed Sheboygan lateral pipeline were identified in the WHS records.

Chapter 6 - WPSC Chilton Lateral

The Chilton lateral proposed by WPSC involves construction of about 1 ¾ miles of 4-inch pipeline in Calumet County. This lateral would connect the Guardian extension with WPSC's existing distribution systems in the Chilton area. Figure 6 is a general map of this lateral.

All of the proposed route for the Chilton lateral would be adjacent to a road. The proposed lateral is located in an area where the major land use is agriculture, with scattered low density residential areas. Woodlots are few and scattered. No major wetland complexes are located along the project route. The lateral crosses one trout stream, Stony Brook.

RARE SPECIES AND COMMUNITIES

No rare species or natural communities were identified by the NHI database within the project area. Stony Brook, which is the only waterway crossed by the project, does not have any NHI occurrences. The lateral does not cross any forested land, but would affect approximately 0.6 acres of lands enrolled in the Conservation Reserve Program (CRP). Since these lands are important for providing habitat for birds and other wildlife that prefer grasslands and open areas, WPSC should work with the landowner to reseed these areas with a native seed mix.

SURFACE WATERS

The proposed WPSC Chilton lateral gas pipeline route involves one waterway crossing. WPSC evaluated the water crossing and developed an initial construction crossing method. The initial crossing method took into account stream width and depth, flow rates, adjacent topography, vegetation, and cost of the possible crossing methods. WPSC representatives, with DNR and PSC review staff, discussed and evaluated possible crossing methods. Further consideration was given to special resources present (including threatened, endangered and special concern species), other physical constraints and limitations, and seasonal flow patterns at specific crossings. A final proposed crossing method was developed from the joint discussions. The water crossing method and construction mitigation methods proposed by WPSC are detailed in the permit application filed by WPSC with the DNR, as well as in information in WPSC's application to the PSC.

The following table identifies the waterway along the proposed Chilton lateral route and the proposed crossing construction method.

Stream #	Stream Name (1)	Type (2)	Crossing Method (2)	Approximate Milepost Location	Associated Wetland
1	Stony Brook	Perennial	HDD	0.36	1

(1) "UNT" = unnamed tributary to

(2) Based on 7.5 minute USGS Topographic quad maps.

(3) "HDD" = Horizontal Directional Drill; "Open Trench (no flow)" = trenching without any stream isolation or bypass, limited to times of no stream flow; "Isolation Trenching" = use of Dam and Pump or Flume crossing methods to isolate trench area from stream flow.

Stony Brook is a designated a Class III trout water. The DNR reviews proposals affecting trout waters to ensure that the project would not directly affect spawning activity, or critical habitat such as spawning beds, pools, or riffles. There are no rare species occurrences recorded for Stony Brook near the proposed crossing location.

WPSC proposes to install the pipeline across Stony Brook using the HDD method. No changes to the bed of this waterway or its water quality are expected to result from the pipeline installation if the HDD crossing method is successful.

WETLANDS

The proposed WPSC Chilton lateral gas pipeline route intersects 2 wetlands, of which one would not be impacted because the pipe would be directionally drilled under it. The construction footprint in wetlands would be 75 feet: 35 feet of permanent easement, and 40 feet of temporary construction easement. The total area of wetlands within the construction zone is 1.2 acres of emergent wetland.

Impacts to the trenched wetland would include an approximate 6-foot wide trench and a 35-foot wide spoil pile adjacent to the trench.

The following table identifies the wetlands along the proposed Chilton lateral route and the proposed crossing construction method for each.

Wetland #	Wetland Type	Crossing Method *	Approximate Milepost Location	Associated Stream
1	Deciduous forested	HDD	1	1
2	Wet meadow	Open Trench	1	

* HDD = Horizontal directional drill

Wetland 1 of the proposed Chilton lateral is associated with an Area of Special Natural Resource Interest, based on a classification of the Stony Brook as a trout stream. The potential impact on the waterway and adjacent wetlands should be minimal, due to the proposed use of HDD construction method. The HDD installation of the pipeline would not directly disturb the surface of the stream or wetland.

Both wetlands contain wet meadows and are dominated by or contain reed canary grass. The likelihood of reed canary grass remaining dominant following construction is high.

No other wetland areas were identified through which construction of the proposed Chilton lateral would result in any unusual or major impacts to the wetlands.

HISTORIC RESOURCES

No known archeological or other historic resources were identified in the records of the WHS that appear to be at risk from construction of the proposed Chilton lateral pipeline.

Chapter 7 - WPSC Denmark Lateral

The Denmark lateral proposed by WPSC involves construction of about 14 miles of 12-inch pipeline in Brown County. This lateral would connect the Guardian extension with WPSC's existing distribution systems in the Denmark area. Figure 7 is a general map of this lateral.

All of the proposed route for the Denmark lateral would be adjacent to existing linear features, roads for about 1 ¾ miles and existing gas pipelines, owned by ANR Pipeline Company, for the remaining 12 ½ miles.

The proposed lateral is located in an area where the major land use is agriculture, with scattered low density residential areas. Woodlots are few and scattered. No major wetland complexes are located along the project route.

The route crosses the edge of the Niagara Escarpment, but does so within an area of relatively gentle, cleared slopes. None of the steep, forested cliffs that give the escarpment its unique qualities would be affected by the proposed lateral.

RARE SPECIES AND COMMUNITIES

Some rare plant and animal species, but no natural community occurrences, were recorded in the area of the Denmark lateral. The natural habitat that is present is primarily dry to mesic southern forests associated with the East River and its tributaries. No CRP parcels would be affected by this lateral.

Fish

The East River and the Branch River are waterways that may support one special concern fish species, the redside dace (*Clinostomus elongatus*) and one state-threatened fish species, the greater redhorse (*Moxostoma valenciennesi*). The redside dace prefers cool water pools and quiet riffles of small streams (usually adjacent to meadows or pastures) with substrate of cobble, sand, clay silt or bedrock. Spawning for this species occurs from May to early June. The greater redhorse prefers clear water of medium to large rivers, over bottoms of sand, gravel, or boulders. Spawning for this species occurs in May or June.

The reach where the Branch River is crossed is surrounded by agricultural lands and has very little riparian vegetation. Thus, it is unlikely these fish species would be present or affected by the project. The East River would be directionally bored and therefore, there would not be any direct impacts to fish habitat unless a frac-out occurs. If this happened, WPSC would implement contingency measures to respond to the release of drill mud.

Invertebrates

Two state-listed and three special concern snail species may be found within the project area. Four of these species prefer algific (cold producing) habitat or the similar cool, moist, shaded

sites in deciduous forests of cliffs and talus slopes where algific conditions occur. The fifth species may prefer drier sites in upland woods and prairies. All of the recorded occurrences of these species have been associated with the Niagara Escarpment. The lateral route crosses the Escarpment adjacent to an existing utility corridor, with a gentle slope, and no bedrock outcrops. The vegetation cover in this area does not create the moist and/or shaded conditions required by the snail species.

Birds

The bald eagle (*Haliaeetus leucocephalus*), a state special concern and federally-listed threatened species, has a nest occurrence near the project area; however, the project activities would not occur within the critical zone of the nest occurrence. Therefore, impact to this species is very unlikely. However, WPSC should reconfirm this determination with the DNR when 2007 monitoring data is available at the end of the year.

Plants

Only one historical occurrence of the American gromwell (*Lithospermum latifolium*), a plant of special concern in Wisconsin, has been recorded in the project area. This species prefers upland hardwood forests, often with dolomite near the surface. Land use along the portion of the route that crosses the escarpment is agricultural, with some riparian woodland and therefore is unsuitable for this species.

NIAGRA ESCARPMENT

The Niagara Escarpment is a prominent geologic feature in eastern Wisconsin. The Niagara Formation is an extensive bedrock layer with edges that form a ridge curving westward from south of Rochester, New York, across southeast Canada, and then southward around the western side of Lake Michigan to southeastern Wisconsin. The formation is typically covered by up to several hundred feet of unconsolidated glacial till along its length with isolated, vertical outcrops and horizontal exposures. The exposed faces of the escarpment provide habitat for many rare species and communities. Of the proposed pipeline projects, only the WPSC Denmark lateral crosses near the exposed faces of the escarpment in Section 23 of the town of Shirley, Brown County. At this location, the escarpment is marked only by the change in altitude, from approximately 650 to 900 feet above sea level, within the 2.5 miles between mileposts 2 and 4.5. There are no exposed faces of the escarpment at the specific crossing location of this lateral, and the land use across this segment is primarily farming, with remnants of natural vegetation persisting only at fence rows and stream crossings.

The Land Legacy Program is a part of a directive from the Natural Resources Board. This board has advised the DNR to identify places critical to meet Wisconsin's conservation and outdoor recreation needs over the next 50 years. Determining where protection efforts should be focused, which protection strategies would be most effective, and who might be involved, would require a more detailed evaluation by the DNR, involving local landowners, citizens, various non-profit organizations, businesses, governments, and others. The area of the Escarpment identified in the Land Legacy program runs from Door County to Dodge County and covers a considerable area

in Wisconsin. The proposed route for the Denmark lateral would follow an existing ANR pipeline corridor across the Escarpment. The Escarpment, at the proposed crossing, is in area of relatively gentle, cleared slopes and not the steep forested cliffs generally associated with the escarpment.

The proposed Denmark lateral is not in an area typically associated with the escarpment and has been previously disturbed through agricultural, residential, and utility use. It is highly unlikely that the proposed 12-inch natural gas line that follows an existing underground pipeline corridor would have a negative impact on this area if it is ever considered for inclusion in the Land Legacy Program,

SURFACE WATERS

The proposed WPSC Denmark lateral gas pipeline route involves ten waterway crossings. WPSC evaluated each water crossing and developed an initial construction crossing method for each. The initial crossing method took into account stream width and depth, flow rates, adjacent topography, vegetation, and cost of the possible crossing methods. WPSC representatives later visited some crossing locations with DNR and PSC review staff to further evaluate possible crossing methods. Further consideration was given to special resources present (including threatened, endangered and special concern species), other physical constraints and limitations (such as concrete bridge footings), and seasonal flow patterns at specific crossings. A final set of proposed crossing methods was developed from the joint discussions. The water crossing methods and construction mitigation methods proposed by WPSC are detailed in the permit application filed by WPSC with the DNR, as well as in information in WPSC's application to the PSC.

The following table identifies the waterways along the proposed Denmark lateral route and the proposed crossing construction method for each.

Stream #	Stream Name (1)	Type (2)	Crossing Method (3)	Approximate Milepost Location	Associated Wetland
1	East River	Perennial	HDD	0	
2	East River	Perennial	HDD	0	
3	East River	Perennial	HDD	1	1
4	UNT East River	Perennial	Trench w/Isolation	1	
5	UNT East River	Perennial	Trench w/Isolation	1	2
6	UNT East River	Perennial	Trench w/Isolation	3	4
7	UNT East River	Perennial	Trench w/Isolation	3	4
8	UNT Branch River	Perennial	Trench w/Isolation	5	
9	UNT Devils River	Intermittent	Open Trench (no flow)	12	7
10	UNT Devils River	Intermittent	Open Trench (no flow)	12	8

(1) "UNT" = unnamed tributary to

(2) Based on 7.5 minute USGS Topographic quad maps.

(3) "HDD" = Horizontal Directional Drill; "Open Trench (no flow)" = trenching without any stream isolation or bypass, limited to times of no stream flow; "Isolation Trenching" = use of Dam and Pump or Flume crossing methods to isolate

trench area from stream flow.

None of the waterways that would be crossed by the proposed Denmark lateral are classified as trout streams, nor are any classified as Outstanding or Exceptional Resource Waters.

The largest waterway along the Denmark lateral route is the East River, which traverses agricultural and urban lands. The water is hard and turbid with many tributaries entering it from the east off of the Niagara Escarpment. It is considered a warm-water forage fishery. The water quality is directly related to the amount of nutrient and stormwater inputs from agricultural practices. The proposed pipeline route crosses a meandering section of the river, where three crossings occur over a short distance. A single, long HDD installation is proposed for the East River, spanning all three crossing locations. No changes to the bed of the East River or its water quality would result from pipeline installation if the HDD crossing method is used.

The evaluation of potential impacts from crossing waterways using any of the following open trench methods assumes that the DNR waterway permit would require use of appropriate erosion control practices, along with restoration of the streambed contours to preconstruction conditions.

Conventional open cut trench construction is proposed for crossing two intermittent waterways if there is no flow at time of construction. Both are unnamed tributaries to the Devils River and have no flowing water during portions of the year. Crossing these intermittent streams during no-flow periods with open cut trenching would not be expected to alter the streams' water quality, streambed configuration, or flow characteristics. WPSC has stated that if there is water flowing at the time of construction, WPSC would install a temporary sandbag cofferdam and would pump the stream water around the work area or the stream would be directionally drilled.

The other five waterways along the route of the Denmark lateral are small, shallow, perennial streams. Four are tributaries to the East River and the fifth is a tributary to the Branch River. A dam and pump or a dam and flume construction method would be used for these five waterways. No unusual resources were identified at any of these five crossing locations. As noted in the overall discussion of potential waterway crossing impacts in Chapter 2, the use of a dam and pump or a dam and flume construction method at these crossings should result in only minor, temporary impacts to the water quality of these streams.

WETLANDS

The proposed WPSC Denmark lateral gas pipeline route involves ten wetland crossings. The construction footprint in wetlands would be 75 feet, with 50 feet of permanent easement and 25 feet of temporary construction easement. The total area of wetlands within the construction zone is 1.3 acres (0.8 acres forested and 0.5 acres emergent). Construction through two of the ten wetlands, totaling 107 feet, would use HDD installation and therefore would not directly affect the surface of the wetlands.

The following table identifies the wetlands along the proposed Denmark lateral route and the proposed crossing construction method for each.

Wetland #	Wetland Type	Crossing Method *	Approximate Milepost Location	Associated Stream
1	Deciduous forested	HDD	1	
2	Deciduous forested	Open Trench	2	
3	Wet meadow	Open Trench	3	1
4	Wet meadow	Open Trench	4	
5	Wet meadow	Avoided	4	2
6	Wet meadow	Open Trench	10	4
7	Wet meadow	Open Trench	12	4
8	Wet meadow	Open Trench	12	
9	Deciduous forested	HDD	14	7
10	Wet meadow	Open Trench	14	7
11	Wet meadow	Open Trench	14	8

***** "HDD" = Horizontal Directional Drill

The majority of the wet meadow type wetlands along the project route are dominated by or contain reed canary grass. The likelihood of reed canary grass remaining dominant following construction is high.

Wetlands 1 and 9 would not be directly impacted during the installation of the pipe, however, these wetlands would be affected by clearing trees from the ROW. Some of the area currently tree covered would be kept permanently clear to allow access and inspection of the pipeline. This would change the wetlands' functional values.

Six of the wetlands that would be crossed by the proposed Denmark lateral are classified as Areas of Special Natural Resource Interest, based on a classification of wetlands adjacent to slopes of greater than 12%, used by Brown County Planning Department. The use of appropriate erosion control practices on the slope areas of these wetlands should provide reasonable protection for the wetlands.

No wetland areas were identified through which construction of the proposed Denmark lateral would result in any unusual or major impacts to the wetlands.

HISTORIC RESOURCES

No known archeological or other historic resources that appear to be at risk from construction of the proposed Denmark lateral pipeline were identified in the WHS records.

Chapter 8 - WPSC Southwest Green Bay Lateral

The Southwest Green Bay lateral proposed by WPSC involves construction of about 8 miles of 20- and 12-inch pipeline in Brown County. This lateral would connect Guardian's extension to existing distribution systems in and around the Green Bay metropolitan area. Figure 8 shows the route proposed.

The proposed project route crosses from agricultural lands into an urban area. The primary land cover along the project route is urban, crossing through both commercial and residential areas. Woodlands, wetlands, and other natural land cover remains in only small and scattered patches. The first section of this lateral, about 1.2 miles in length, would be adjacent to railroad and electric transmission line ROWs through agricultural lands that are being converted to an industrial park use. The remainder of the proposed route would be located within city streets.

RARE SPECIES AND COMMUNITIES

This lateral traverses a highly developed landscape and the longest undeveloped segment from MP 1.0 to MP 2.0 would parallel a proposed road extension. One state-listed turtle species, one state-listed fish species and seven special concern species were identified by the NHI database within the project area.

Fish and turtles

The only waterway crossed by the project is Ashwaubenon Creek. This creek is unlikely to support habitat for two of the three aquatic species, the lake sturgeon (*Acipenser fulvescens*) (state special-concern) and American eel (*Anguilla rostrata*) (special concern). A third species, the longear sunfish (*Lepomis megalotis*) (state threatened) is associated with an adjacent waterway that would not be affected by the project. Although Ashwaubenon Creek has not been inventoried for this species, it is being directionally bored, and therefore, the risk to this species is low.

Ashwaubenon Creek also supports the wood turtle (*Clemmys insculpta*) (state-threatened); however, this segment of the ROW is bordered on one side by a city street and the entire segment would be bored. Therefore, while the habitat may be low to moderately suitable, it would not be affected by construction activities and therefore, the species, if present, is unlikely to be affected.

Invertebrates

Two special concern butterfly species may be present in the project area. Both species prefer upland areas, which may be present along undisturbed corridors like railroads or fencerows. However, the lateral route was shifted to avoid these habitat areas. Therefore, impact to these species is unlikely.

Birds

The bald eagle (*Haliaeetus leucocephalus*), a state special concern and federally listed threatened species, has a nest occurrence in the project area; however, the project activities would not occur within the critical zone of the nest occurrence. Therefore, impact to this species is very unlikely. However, WPSC should reconfirm this determination with the DNR when 2007 monitoring data is available at the end of the year.

The dickcissel (*Spiza americana*), a state special concern species, may be present in the project area. This species prefers open pasture, uncultivated fields, and prairies. Some suitable habitat for the dickcissel may be present along the southernmost two miles of this lateral. This portion of the lateral route is a combination of active farmlands and currently fallow fields that were previously cropped. The active farmlands consist of corn and alfalfa fields, both poor habitat for dickcissels. The other fields that are currently fallow may provide suitable dickcissel habitat. These fallow fields, however, are on the edge of an expanding industrial park area and are being affected by ongoing extension of roads and conversion of the fields to building sites. These ongoing human disturbances are expected to greatly reduce or eliminate the potential dickcissel habitat along the pipeline route.

SURFACE WATERS

The proposed WPSC Southwest Green Bay lateral gas pipeline route involves one waterway crossing. WPSC evaluated the waterway crossing and developed an initial construction crossing method. The initial crossing method took into account stream width and depth, flow rates, adjacent topography, vegetation, and cost of the possible crossing methods. WPSC representatives later visited the crossing location with DNR and PSC review staff to further evaluate possible crossing methods. Further consideration was given to special resources present (including threatened, endangered and special concern species), other physical constraints and limitations (such as concrete bridge footings), and seasonal flow patterns at specific crossings. A final proposed crossing method was developed from the joint discussions between WPSC, DNR and PSC representatives. The water crossing method and construction mitigation method proposed by WPSC are detailed in the permit application filed by WPSC with the DNR, as well as in information in WPSC's application to the PSC.

The following table identifies the waterway along the proposed Southwest Green Bay lateral route and the proposed crossing construction method.

Stream #	Stream Name (1)	Type (2)	Crossing Method (3)	Approximate Milepost Location	Associated Wetland
1	Ashwaubenon Creek	Perennial	HDD	7	1 and 2

(1) "UNT" = unnamed tributary to

(2) Based on 7.5 minute USGS Topographic quad maps.

(3) "HDD" = Horizontal Directional Drill; "Open Trench (no flow)" = trenching without any stream isolation or bypass, limited to times of no stream flow; "Isolation Trenching" = use of Dam and Pump or Flume crossing methods to isolate trench area from stream flow.

This waterway is not classified as a trout stream, nor is it classified as Outstanding or Exceptional Resource Water. Ashwaubenon Creek is a sluggish, turbid, hard water stream flowing through agricultural and residential Brown County. The bottom materials consist of rubble, gravel and silt. The banks in the agricultural areas are bare. It is considered a warm water forage fishery with little fisheries value. The water quality is directly related to the amount of nutrient and stormwater inputs from agricultural practices. A single, long horizontal directional drill (HDD) installation is proposed for the waterway, which is located at the bottom of a steeply sided ravine. No changes to the bed of the Ashwaubenon Creek or its water quality would result from pipeline installation if the HDD crossing method is used.

The evaluation of potential impacts from crossing the waterway using the HDD method assumes that the DNR stormwater permit would require use of appropriate erosion control practices along with the restoration of the upper streambank contours to preconstruction conditions.

WETLANDS

The proposed WPSC Southwest Green Bay lateral gas pipeline route crosses two wetlands that would not be impacted because the pipe would be directionally bored under them. The total area of wetlands within the permanent easement is 0.2 acres. Both are scrub/shrub wetlands.

The following table identifies the wetlands along the proposed Southwest Green Bay lateral route and the proposed crossing construction method for each.

Wetland #	Wetland Type	Crossing Method *	Approximate Milepost Location	Associated Stream
1	Scrub/shrub	HDD	7	1
2	Scrub/shrub	HDD	7	1

* "HDD" = Horizontal Directional Drill

The two wetlands would not be directly impacted by the installation of the pipe, however, the wetlands would be impacted by clearing shrubs from the ROW. Some of the area currently supporting shrubs would need to be kept permanently clear to allow access and inspection of the pipeline. This would change the wetland's functional values.

Both wetlands are classified as Areas of Special Natural Resource Interest, based on a classification of wetlands adjacent to slopes of greater than 12%, used by Brown County Planning Department. The use of appropriate erosion control practices on the slope areas of these wetlands should provide reasonable protection for the wetlands.

No wetland areas were identified through which construction of the proposed Southwest Green Bay lateral would result in any unusual or major impacts to the wetlands.

HISTORIC RESOURCES

No known archeological or other historic resources that appear to be at risk from construction of the proposed Southwest Green Bay lateral pipeline were identified in the WHS records.

Chapter 9 - Guardian Mainline

DNR staff provided PSC staff with most of the information contained in this chapter of the EA. The information is based on a preliminary review, by DNR Office of Energy staff, of application materials submitted by Guardian to FERC and DNR.

Guardian proposes to extend its existing pipeline system by constructing about 110 miles of 30-inch and 20-inch diameter pipeline between Jefferson and Brown Counties. Figure 1 is a general project map. Guardian would also construct two 39,000 hp compressor stations, one in De Kalb County, Illinois, and the other in Walworth County, Wisconsin.

Guardian's proposed pipeline passes through a section of the state where the major land use is agriculture, with scattered low density residential areas. Woodlots and wetlands are generally small and scattered. Guardian's proposed route avoids, for the most part, any highly developed urban areas.

RARE SPECIES AND COMMUNITIES

The U.S. Fish & Wildlife Service (FWS) staff identified the bald eagle (*Haliaeetus leucocephalus*), whooping crane (*Grus americana*), eastern massasauga (*Sistrurus catenatus catenatus*), Karner blue butterfly (*Lycaeides melissa samuelis*), eastern prairie fringed orchid (*Platanthera leucophaea*), and dwarf lake iris (*Iris lacustris*) as potential species of concern in the general project area. After reviewing additional information on habitat characteristics within the project area, the FWS indicated that only two of the federally-listed species potentially occurring in the project area, the bald eagle and the eastern prairie fringed orchid, should be further evaluated. Both the bald eagle and the eastern prairie fringed orchid are federally-listed as threatened. The bald eagle is also a state special concern species and the eastern prairie fringed orchid is state-listed as endangered.

The FWS identified records of bald eagle nests within about 0.5 mile of the proposed Fox River crossing location. The FWS would determine whether construction activities would be close enough to disturb nesting activities and if so, whether timing restrictions should be applied. Guardian would obtain updated monitoring information in 2007 and 2008 from the DNR and FWS prior to construction and reconfirm appropriate measures to avoid or minimize impact to the bald eagle.

The eastern prairie fringed orchid was identified near the proposed G-II pipeline route in Jefferson County. The FWS recommended that Guardian screen the project corridor for suitable habitat for the eastern prairie (white) fringed orchid. This species prefers mesic prairies, especially on calcareous, rich, sandy or deep black soils, and degraded sedge meadows. Guardian conducted habitat screening during its wetland delineation field surveys and found no suitable habitat for this species. Both FWS and DNR concur with the conclusion that suitable habitat is not present. However, should suitable habitat or individuals of the species be identified during wetland field surveys and/or construction, Guardian would continue its consultation with the FWS, and would implement the measures recommended by the FWS to avoid, minimize, or mitigate potential impacts on this federally-listed plant species.

To investigate the presence of state-listed species in the vicinity of the project area, Guardian used NHI data obtained from the DNR's Bureau of Endangered Resources. Guardian generated data regarding known occurrences of individual species using a two-mile-wide buffer, which produced 16 listed species occurrences, including four species that are state-listed endangered and threatened species, and 12 that are designated as species of special concern. Two of the species, the bald eagle and the eastern prairie fringed orchid, have already been discussed.

Guardian has completed consultations with the DNR to identify the specific state-listed species and/or species of special concern that should be included in the species surveys for the G-II Project. Those species with habitat that could potentially occur in the project area, such as the Blanchard's cricket frog, wood turtle, Blanding's turtle, and rare plant species, could experience reduced habitat quality or mortality (e.g., crushing or trapping) if areas they occupy are disturbed during construction.

The two snail species are associated with moist, cool, shady conditions present along the Niagara Escarpment. Habitat for these snails is not present within the area that would be affected by pipeline construction.

Guardian has completed fall surveys for yellow gentian and forked aster. The results of those surveys were negative. Additional surveys for the remaining rare plants, birds, reptiles and amphibians or their habitat would be completed during the optimal time of the year in the spring of 2007. If these species or their suitable habitat are present, the DNR would identify measures to avoid impacts to these species that include:

- exclusion fencing to prevent animals from entering the workspace
- timing restrictions to coincide with periods when the animal is hibernating and inactive or when birds are not breeding or nesting
- adjusting the workspace to avoid rare plant populations
- restoration of essential habitat elements to pre-construction conditions or better

In conclusion, there are several state or federal rare species known to occur near or within the counties traversed by the GII pipeline. Several of these species require habitat conditions, e.g., alkaline wetlands, algific cliffs, etc., that are not present along the proposed pipeline route. Guardian has completed surveys for some of the remaining species and would complete the remainder of the surveys in spring 2007. Both the FWS and DNR have established measures to avoid or minimize impacts to those rare species such that significant impact to any of these species is unlikely.

Federal and State-listed Endangered and Threatened Species
Potentially Occurring in the Vicinity of the Proposed Guardian Expansion Project

Species	Federal Status	State Status *	Notes
FEDERALLY LISTED SPECIES			
bald eagle (*Haliaeetus leucocephalus*)	Threatened	WI - SC	Two nests identified within 0.5 mile of the Fox River crossing. Pre-construction surveys recommended in this area to document nesting activity.
eastern prairie fringed orchid (*Platanthera leucophaea*)	Threatened	WI - Endangered	This species may be found in moist soil wetlands and wet prairies.
WISCONSIN-LISTED SPECIES			
Blanchard's cricket frog (*Acris crepitans blanchardi*)	--	WI - Endangered	Historically, the range of this species in Wisconsin is limited to the southern half of the state. Mud flats and stream banks with abundant, low emergent vegetation are preferred habitats. Also inhabit marshes, fens, and wet prairies near permanent and flowing water.
Blanding's turtle (*Emydoidea blandingii*)	--	WI - Threatened	Found throughout the state, except the extreme north-central. Concentrated in the vast marshes along the Wisconsin River. Primarily inhabit marshes and the shallow bays of lakes, but also utilize shallow, slow-moving rivers and steams.
wood turtle (*Clemmys insculpta*)	--	WI - Threatened	Primarily found along the Black, Wisconsin, St. Croix, Brule, and Baraboo Rivers. Forage in deciduous forests and open meadows adjacent to these rivers during the summer. Some individuals may inhabit rivers year round.
handsome sedge (*Carex Formosa*)	--	WI - Threatened	Difficult to identify in the field. Only two known sites in Wisconsin. This specie range in Wisconsin includes Door, Brown, Milwaukee, Outagamie, and Ozaukee Counties.
northern yellow lady's-slipper (*Cypripedium parviflorum* var. *makasir*)	--	WI – SC	Generally found in calcareous fens, but may also be found in other wet sites, especially with organic-rich or sandy soils.
a land snail (*Catinella gelida*)	--	WI – SC/N	Found in terrestrial deciduous forests.
honey vertigo (*Vertigo tridentata*)	--	WI – SC/N	Found in terrestrial deciduous forests.
thin-lip vallonia (*Vallonia perspectiva*)	--	WI – SC/N	Found in terrestrial deciduous forests along streams and creeks.
side-swimmer (*Crangonyx gracilis*)	--	WI – SC/N	Marsh, lake, and stream bottoms.
redside dace (*Clinostomus elongatus*)	--	WI – SC/N	Typically occur in clear, cool headwaters of river systems. Streams are generally small with moderate to high gradients, adequate overhanging vegetation to provide ample shading of the stream, abundant coarse woody debris, and clean substrates of gravel, sand, cobble and bedrock.

Federal and State-listed Endangered and Threatened Species
Potentially Occurring in the Vicinity of the Proposed Guardian Expansion Project

Species	Federal Status	State Status *	Notes
two-spotted skipper (*Euphyes bimacula*)	--	WI – SC/N	Found inhabiting marshes, bogs, wet stream sides and wet sedge meadows.
northern harrier (*Circus cyaneus*)	--	WI-SC/M	Found in retired cropland (timothy/quackgrass), old field habitat, sedge meadow, and restored prairies
yellow-billed cuckoo (*Coccyzus americanus*)	--	WI-SC/M	Open woodlands with dense undergrowth, overgrown orchards and pastures, moist thickets and willow groves along stream banks
black-throated blue warbler (*Dendroica caerulescens*)	--	WI-SC/M	Found in dense hardwood or coniferous undergrowth of mesic deciduous forests
prothonotary warbler (*Protonotaria citrea*)	--	WI-SC/M	Cavity nester along dense hardwood forests along streams and in swamps
western meadowlark (*Sturnella neglecta*)	--	WI-SC/M	Meadows, plains, prairies , cropland and other open grasslands

* SC = Special Concern Species. SC/N = no laws regulating use, possession, or harvesting. SC/M = fully protected by federal and state laws under the Migratory Bird Treaty Act.

SURFACE WATERS

The proposed Guardian project would cross 111 waterways, including 29 perennial streams, 81 intermittent streams, and 1 pond. Guardian evaluated each water crossing and developed an initial construction crossing method for each that took into account stream width and depth, flow rates, adjacent topography, vegetation, and the cost of the possible crossing methods. Guardian, and DNR review staff later visited some crossing locations and further consideration was given to special resources present (including threatened, endangered and special concern species), other physical constraints and limitations (such as concrete bridge footings), and seasonal flow patterns at specific crossings. A final set of proposed crossing methods was developed from these discussions.

The water crossing methods and construction mitigation methods proposed by Guardian are detailed in the draf*t* permit application filed with the DNR. In addition, DNR permits are likely to require isolating the work zone from the waterway at all waterway crossings unless the waterway is dry or has no flow for the duration of the work below the ordinary high water mark.

The Guardian draft DNR permit application identifies the waterways along the proposed G-II mainline route, their location, and the proposed crossing construction method for each. Site specific plans for the waterways crossings are also included in the application.

Guardian proposes to install the pipeline using horizontal directional drilling (HDD) for six of the waterways. No changes to the bed of these waterways or their water quality are expected to

result from the pipeline installation if the HDD crossing method is successful (see general description of this crossing method for details).

Guardian proposes to install the pipeline using open-cut trenching for all 81 intermittent streams with no flowing water. Open cut trenching during no-flow periods would not be expected to alter the streams' water quality, streambed configuration, or flow characteristics. This technique also allows the crossing to be completed in the shortest time.

If a stream has flowing water, Guardian would utilize either the dam and flume technique or the dam and pump technique. Guardian has stated that if there is water flowing at the time of construction, a temporary sandbag cofferdam and pump or flume would be placed in the stream in order to isolate the work area.

The evaluation of potential impacts from crossing waterways using any of these open trench methods assumes that the DNR waterway permit would require use of appropriate erosion control practices along with the restoration of the streambed contours to preconstruction conditions.

WETLANDS

The proposed Guardian II natural gas pipeline route intersects 125 wetlands. The wetlands impacted include 88 emergent, 21 scrub/shrub, and 16 forested/mixed wetlands. The construction footprint in wetlands would be 75 feet, consisting of 50 feet of permanent easement and 25 feet of additional temporary construction easement. The total area of wetlands within the construction zone is 62.3 acres

The draft Application for Waterway/Wetland Permits submitted to the DNR identifies the wetlands, wetland types, and crossing locations along the proposed mainline route

Four of the wetland plant communities that would be crossed by the proposed G-II mainline have a Floristic Quality Index (FQI) above 20. The wetlands are located near milepost (MP) 69.7, 73.7, 102.5, and 102.6. An FQI value below 20 generally indicates a disturbed plant community, while an FQI value above 20 generally indicates a plant community that is relatively undisturbed and possesses high floristic qualities. Because not all wetlands along the proposed route have been field delineated, additional wetlands may have FQI values above 20.

Many of the wet meadow type wetlands are dominated by or contain reed canary grass. The likelihood of reed canary grass remaining dominant in these wetlands following construction is high. In wetlands that contain the grass, it is likely the ROW and workspace area would become dominated by the grass because of the disturbance and spreading of the plant rhizomes, which facilitate spread. A wetland that does not currently contain reed canary grass would be protected from the introduction of this species by construction mitigation techniques to be required for the project.

The evaluation of potential impacts from crossing wetlands assumes that the DNR waterway and wetland permit would require use of appropriate erosion control practices along with the restoration of the wetland contours to preconstruction conditions.

Chapter 10 - Summary

Proposed Projects

Guardian Pipeline LLC has an existing high-capacity natural gas line extending from the Chicago area northward to near Ixonia in Jefferson County. Guardian proposes to extend its natural gas transmission pipeline from Ixonia into the Green Bay area by installing about 110 miles of new pipeline. Guardian also proposes to construct two new compressor stations, the first in northern Walworth County and the second in northern Illinois.

Guardian's interstate pipeline system transports natural gas supplies into Wisconsin for delivery into the distribution systems of local gas utilities, who in turn deliver the gas to retail customers.

WG, WEPCO, and WPSC are proposing to connect their existing gas distribution systems to the Guardian pipeline extension at seven locations, six of which would require construction of gas pipeline laterals.

Regulatory Authority

To construct the lateral pipelines, WG, WEPCO and WPSC must receive overall construction authorizations from the PSC, while Guardian must receive an overall construction certificate from the FERC. In addition, Guardian, WG, WEPCO and WPSC must receive permits and approvals from the DNR and U.S. Army Corps of Engineers (USACE) for construction across waterways and wetlands.

Potential Impacts

During construction of the pipelines, the applicants would acquire an easement that would allow enough space to operate the construction equipment and allow space for soil piles, etc. Following construction, a permanent easement centered along the pipeline would be retained to protect against excavations near the pipe and to allow access for maintenance and repair. The permanent easement is usually considerably narrower than the construction easement. Portions of the proposed lateral projects would occur within the ROWs of existing roads. In these situations, authorizations to work in and occupy parts of the right-of-way are usually granted to the applicant, rather than the acquisition of an easement.

The large range of pipe sizes being proposed for Guardian and the laterals makes it difficult to simply characterize the construction work space needed. In general, however, a construction easement of between 100 and 150 feet wide can be expected where construction occurs on private easements. In wetlands and wooded areas, the construction work space is usually narrowed to a width of about 75 feet. About 50 feet on the construction work space would be retained for the permanent easement.

The proposed Guardian mainline and the Hartford/West Bend, Sheboygan, Chilton, and Denmark laterals are located in areas where the major land use is agriculture, with scattered low-density residential areas. The Sheboygan lateral would cross through lands of the Kettle

Moraine State Forest; however, most of the gas pipeline would be located within an existing electric transmission line ROW through the state forest. Otherwise, woodlots along these four laterals are few and scattered. Each lateral would also cross a number of waterways and scattered wetlands.

The Fox Valley and Southwest Green Bay laterals both extend from agricultural lands into actively expanding urban areas. Residential and commercial developments are the dominant land uses as these routes enter urban areas. Only small, isolated wetland and forest resources are present along these two project routes.

Construction of the proposed combined mainline/lateral projects would require multiple waterway crossings, including 111 by the Guardian mainline, 13 by the Hartford/West Bend lateral, up to 17 by the Fox Valley lateral, 21 by the Sheboygan lateral, one by the Chilton lateral, 10 by the Denmark lateral and one by the Southwest Green Bay lateral.

Approximately 119 of the waterway crossings are streams that are intermittent, with periods of the year where no water flow occurs. DNR permit staff has indicated that open cut trench construction would be allowed to cross these intermittent waterways only at times of no flow. Crossing the intermittent streams during no-flow periods with open cut trenching would not alter the streams' water quality or have any direct affect on aquatic life. With simple restoration efforts, there would also not be any substantial change to streambed configuration or flow characteristics as a result of open trenching of intermittent streams under no-flow conditions.

The remaining 57 crossings are perennial waterways with flow year-round. Included in the perennial crossings are one state Outstanding Resource Water, one federal Section 10 Waterway, and six state-designated trout streams. The potential environmental consequences to the waterways that would be crossed using horizontal directional drilling or bore and jack pipeline construction method would be minimal, due to the fact that those pipeline installation methods do not directly disturb the bed or water column of the waterway. The potential impacts to the perennial waterways that would be crossed using a dam and pump or flume method, are also expected to be minor, with impacts primarily related to inhibiting movement of fish and other aquatic organisms through the construction zone.

About 63 acres of wetland would be impacted during construction of the proposed Guardian mainline and the six lateral pipeline projects together would affected about 40 acres, for an overall total of about 103 acres of affected wetland. Most of the potential impacts to wetlands are temporary in duration, with no substantial long-term impacts anticipated.

Construction activities in wetlands generally involve ROW and workspace clearing, erosion control installation, topsoil stripping, trench excavation and pipe stringing, pipe installation and backfilling, and site restoration.

The potential impacts to wetlands include both permanent and temporary impacts. Permanent impacts include actual placement of pipeline in the wetland and the clearing of trees and shrubs to maintain the pipeline ROW. This clearing would change the nature of the wetland habitat and its functional values.

Temporary impacts of pipeline construction through wetlands include: compaction of soils and alterations of important microtopography within the wetland that could potentially alter the hydrology; changes to plant composition including the introduction of invasive species; and soil mixing within the excavated areas.

Impacts to wetlands and streams would be minimized and mitigated through various measures proposed by the company and additional measures that will be specified in DNR and U.S. Army Corps of Engineers permits. No permits would be issued for activities that do not meet the NR 103 Wetland Water Quality Standards provisions, or the requirements of DNR Chapter 30 waterway permits. Meeting these standards helps to ensure that impacts are avoided and minimized.

About 52 acres of forest land would be directly affected by construction of the Guardian mainline and about 20 acres of forest would be affected by construction of the six lateral pipelines. The combined total would be about 72 acres of forest lands. These figures represent the area that would be cleared of all trees in the construction work space.

The removal of the tree cover is a substantial change to the plant and animal communities in the areas cleared. This change would be permanent for much of the area cleared. No extensive individual wooded areas would be cleared of trees. The amount of tree clearing needed for any specific wooded area is small, consistent with the highly fragmented and developed nature of the landscape in the project area.

One of the lateral projects, the WPSC Sheboygan lateral, would cross an area with extensive forest lands, the Kettle Moraine State Forest. The proposed route through the Kettle Moraine, however, would locate the pipeline within an already cleared ROW for a high-voltage electric transmission line. No additional tree clearing would be necessary in this area.

There are several state or federal rare species known to occur near or within the counties traversed by the proposed Guardian mainline project. Several of these species require habitat conditions that are not present along the pipeline construction route, e.g., alkaline wetlands, algific cliffs, etc. Guardian has completed surveys for some of the remaining species and would complete the remainder of the surveys prior to construction in spring 2007. Both the FWS and DNR have established measures to avoid or minimize impacts to those species such that significant impact to any of these species is unlikely.

Because the routes of the proposed lateral projects pass through landscapes dominated by agriculture and urban areas, they do not have many rare species occurrences. The route for the WPSC Sheboygan lateral passes through the Kettle Moraine, an area with large tracts of relatively undisturbed lands and which harbors many rare species. The proposed gas pipeline through the Kettle Moraine, however, would be located within an existing electric transmission line ROW, which greatly reduces its potential to affect rare plants and animals. The route for the WPSC Denmark lateral crosses the edge of the Niagara Escarpment, but does so in an area of relatively gentle, cleared slopes. None of the steep, forested cliffs that give the escarpment its unique qualities, and provides significant habitat for many rare species, would be affected by

construction of the proposed lateral. Overall, no appreciable negative impact on the long-term survival of existing populations of rare species is expected.

Construction of large pipelines can damage or reduce the suitability of lands for agricultural use. Potential impacts included soil compaction, mixing of soil layers, disrupting drainage patterns, and increasing the density of rocks near the surface of the soil. These impacts can lead to reduced crop productivity or damage to farm equipment.

When constructing the proposed pipelines through agricultural lands, Guardian, WG, WEPCO, and WPSC have all proposed to use construction practices to help address these issues. The proposed construction practices are based on experience with past pipeline construction projects. The proposed practices include: methods to segregate topsoil and subsoils; practices for stabilizing exposed soils to reduce runoff and erosion of silts and sediments; methods to locate, protect, and repair any soil drainage systems crossed by the pipeline projects; soil restoration methods to eliminate compaction and to reduce the increase of rock near the soil surface; and seeding methods, where appropriate. Implementing the proposed agricultural construction practices should greatly reduce or eliminate the major impacts associated with construction through farmlands.

Construction equipment used to install the pipelines would produce air pollutant emissions. In addition, there is a potential for periodic short-duration emissions resulting from operation of the emergency generator that would be located at Guardian's Bluff Creek compressor station in Walworth County. Neither source of emissions would be expected to result in any significant degradation of air quality in the project area.

The construction of the proposed gas pipelines could also create a nuisance disturbance. Noise and vibrations generated from construction equipment could be bothersome. These effects would generally be short-term and would end when construction is complete.

Chapter 11 - Public Service Commission Evaluation

Wis. Admin. Code § PSC 4.20(2)(d) identifies ten broad factors, which are useful to consider when evaluating whether an Environmental Impact Statement is warranted for a given PSC action. The following subsection discusses each of the ten factors.

This evaluation specifically considers only the lateral pipeline projects proposed by WG, WEPCO and WPSC, which have applications pending before the PSC. While this EA recognizes that the related pipeline project by Guardian is necessary for the proposed lateral pipelines to function, there is no PSC regulatory authority related to Guardian's project.

Effects on geographically important or scarce resources, such as historic or cultural resources, scenic or recreational resources, prime farmland, threatened or endangered species and ecologically important areas.

No geographically important or scarce resources within the project area are expected to be significantly affected by construction of the proposed lateral pipeline projects. The portion of the Sheboygan lateral route that passes through the Kettle Moraine State Forest is located within an existing disturbed transmission line ROW.

Conflicts with federal, state or local plans or policies

There are no known conflicts of the proposed actions with any federal, state or local plans or policies. Staff of the Kettle Moraine State Forest indicated that the proposed gas lateral would not affect protection or management of the natural resources present in the state forest.

Significant controversy associated with the proposed action

There is no known controversy regarding the type, magnitude or significance of the expected environmental impacts of the proposed lateral pipeline projects.

Irreversible environmental effects

If the Guardian expansion and the lateral pipelines are installed, the effects associated with the long-term presence of the pipelines would be irreversible. This is because pipelines are generally abandoned in place, rather than being removed, when they are no longer useful. However, the ROW could revert to its original vegetative cover if the pipelines were ever abandoned.

Generally, the construction and long-term presence of the proposed lateral pipeline projects are not expected to result in any significant long-term environmental effects. Shorter-term effects, such as localized noise, air quality degradation and increased dust form construction activities would occur only during the construction period.

New environmental effects

The proposed projects would not result in any new environmental effects. The construction of large-diameter natural gas pipelines is a common activity of Wisconsin gas utilities. The multiple projects, and their combined length, however, exceeds that of most recent individual gas utility construction projects.

Unavoidable environmental effects

The construction of the proposed lateral pipeline projects would result in short-term, localized increases in noise, vibrations, air quality degradation, odors, erosion and run-off, all of which are expected to be minor.

The precedent-setting nature of the proposed action

The proposed lateral pipeline projects would not set any precedents.

The cumulative effect of the proposed action when combined with other actions and the cumulative effect of repeated actions of the type proposed

The proposed project is a common construction activity of Wisconsin natural gas utilities, even though the combined length of the multiple proposed projects is somewhat longer than most projects. Commission staff has reviewed many similar projects. Many gas utility projects are constructed in already disturbed and extensively maintained road ROWs where the potential environmental effects are generally minor. The proposed lateral pipeline projects, however, would primarily be constructed on new easements on private property which is extensively used for agriculture. The overall cumulative effect of repeated actions of the type proposed is considered minor, but each project has been screened for the presence of unusual resources or circumstances. None of the individual or combined impacts on these types of resources is expected to be significant.

The foreclosure of future options

Commission staff is not aware of any options for long-term future gas system reinforcement or expansion that would be either foreclosed by the proposed project or necessary if the proposed project were put in place.

Direct and indirect environmental effects

Most of the direct environmental effects of the proposed project are short-term, localized effects from construction activities. No long-term direct environmental effects are expected, with the exception of the permanent clearing of trees in some portions of the proposed routes. No indirect environmental effects have been identified.

Conclusion

Public Service Commission staff has not identified any potential environmental effects of the six proposed lateral projects that could be considered significant. The construction of the proposed project would result in mostly short-term, localized increases in noise, vibrations, air quality degradation, odors and erosion and run-off, all of which are expected to be minor.

Most of the proposed routes cross landscapes or areas that have been previously disturbed by construction of roads or transmission lines or the long-term use of agricultural practices.

RECOMMENDATION:

__X__ No significant impact. Environmental review complete. Preparation of an environmental impact statement is not necessary.

_____ Prepare an environmental impact statement.

Submitted by: Michael John Jaeger

Title: Gas Policy Analyst

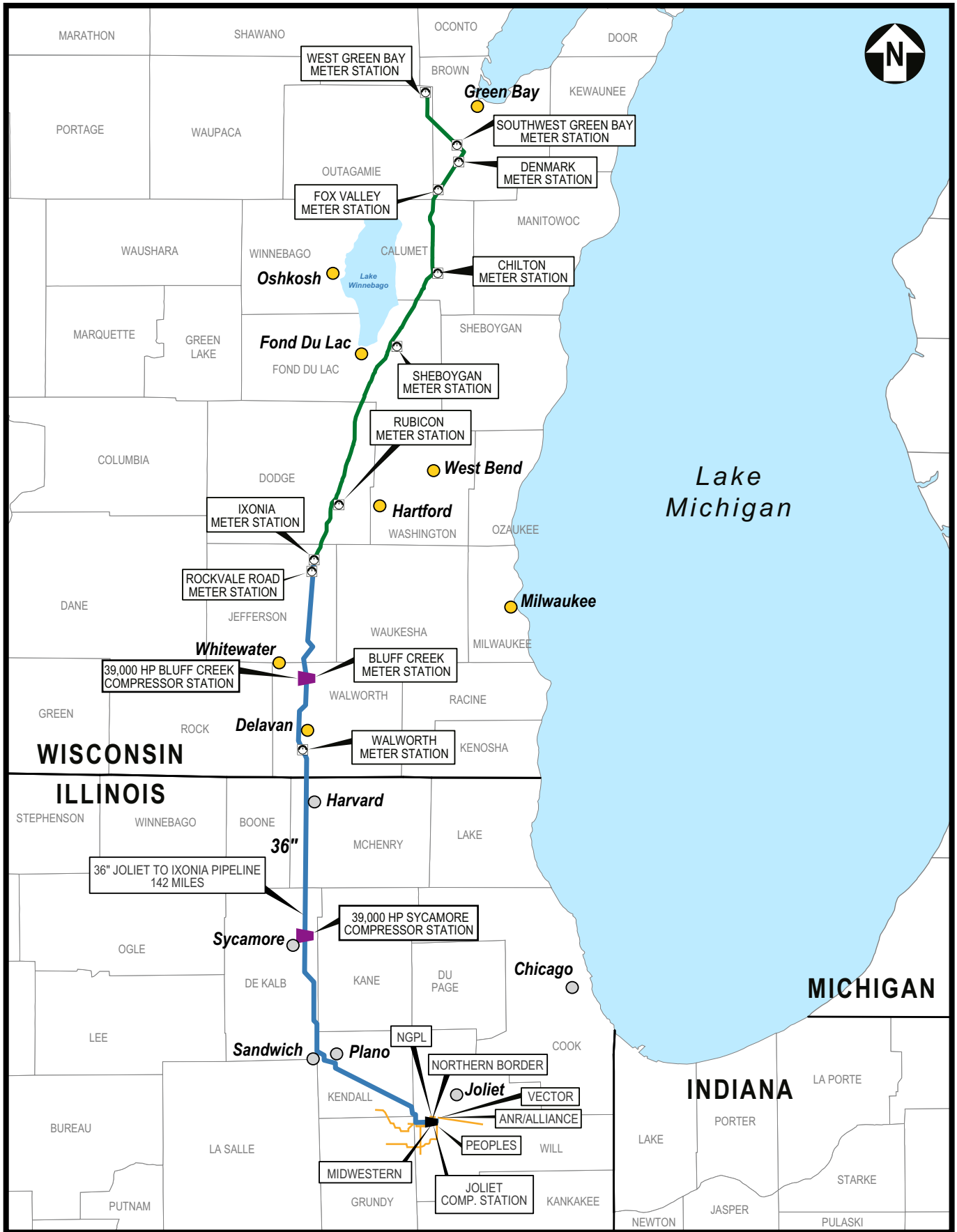
Date: March 9, 2007

This environmental assessment complies with Wis. Stat. § 1.11, and Wis. Admin. Code § PSC 4.20.

By: _____Kathleen J. Zuelsdorff_____
Kathleen J. Zuelsdorff, WEPA Coordinator

Date: ____March 30, 2007_____

Figure 1 – Guardian Expansion Route



LEGEND

- Guardian II
- Existing 36" Guardian Pipeline
- Receipt Point Interconnect Pipelines
- Meter Station
- Compressor Station

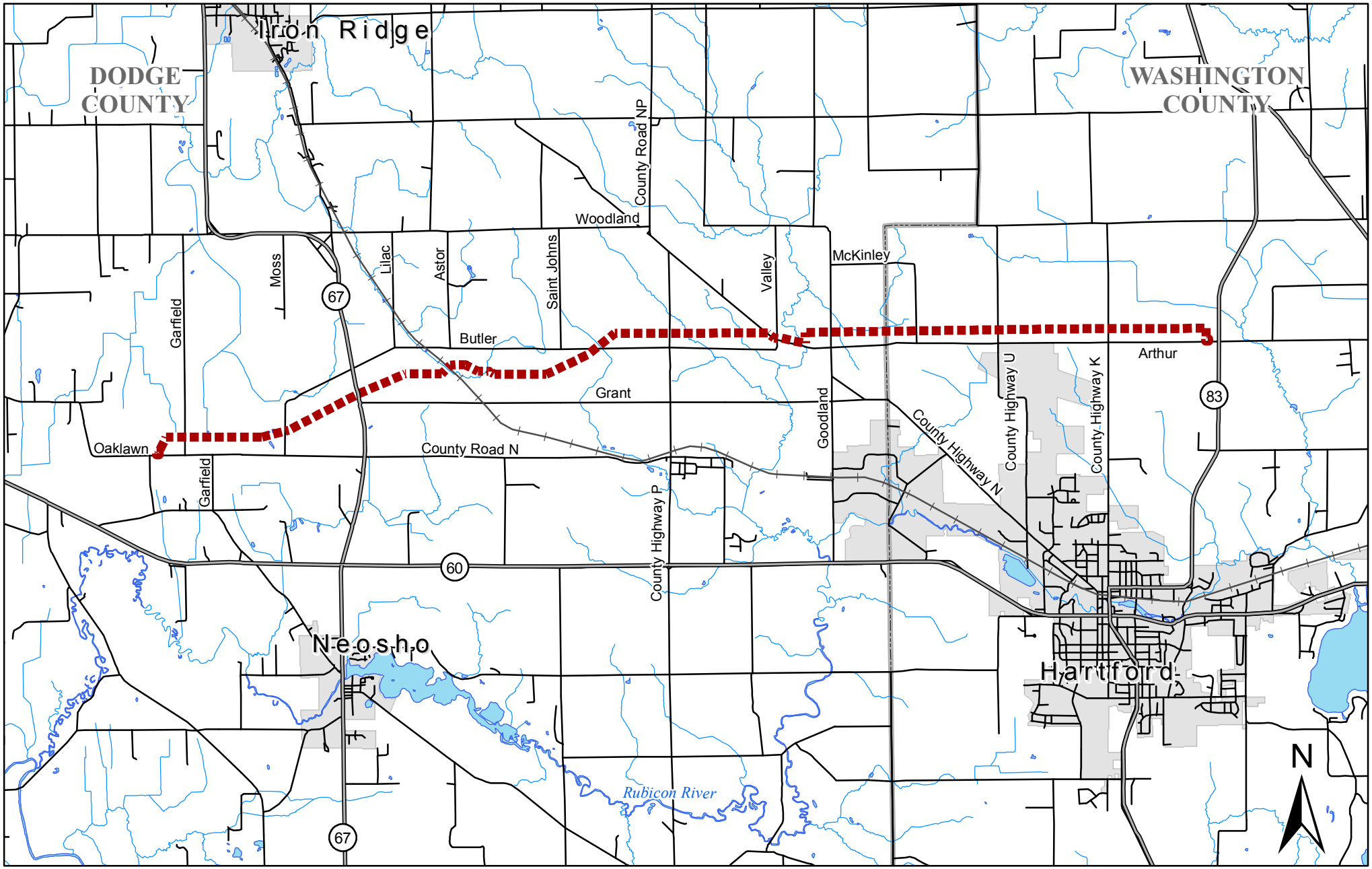
GUARDIAN PIPELINE

GUARDIAN EXPANSION AND EXTENSION PROJECT SYSTEM MAP

APPROVED: GCB	DATE: 7/21/06	G2A-P00-101	REV. B

d:\mfitz\Project\51517\G2A-P00-101 REV B.ai (rev. 7-21-06)

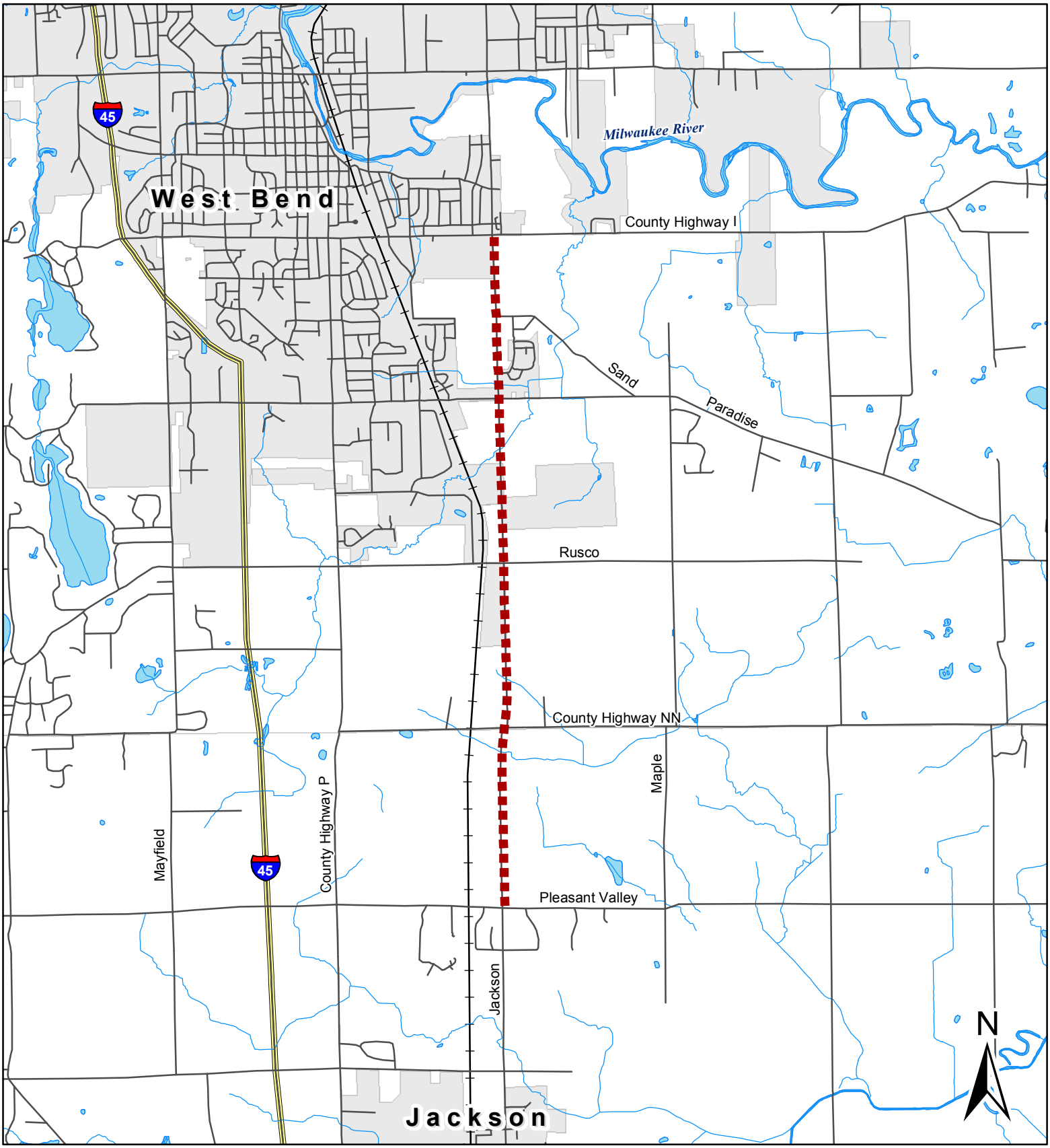
Figure 2 – WG Hartford Segment Route of Hartford/West Bend Lateral



Hartford Section of Proposed Wisconsin Gas Lateral
Docket # 6650-CG-220

0 1 2 3 4 5 6 Miles

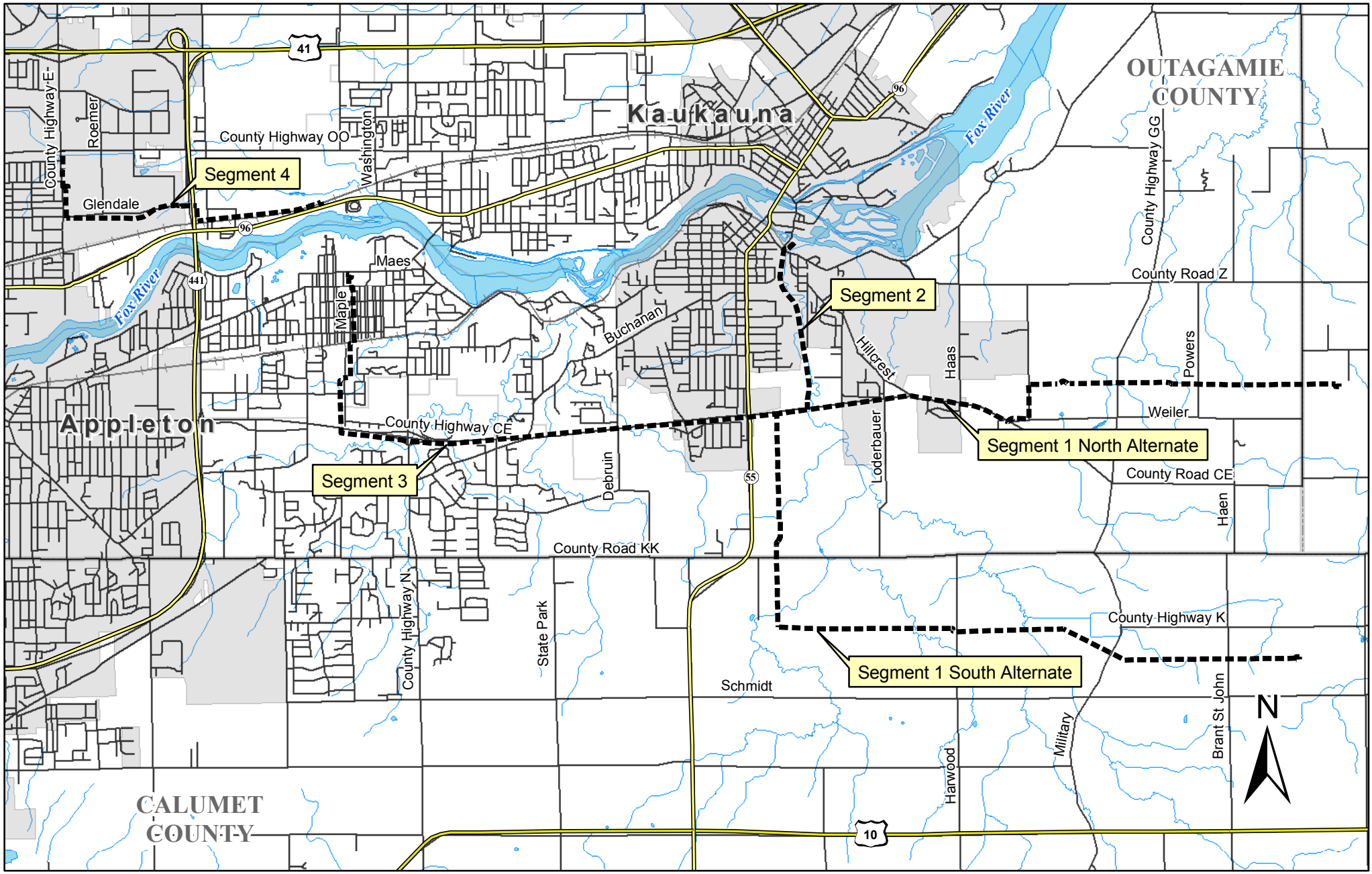
Figure 3 – WG West Bend Segment Route of Hartford/West Bend Lateral



West Bend Section of Proposed Wisconsin Gas Lateral
Docket # 6650-CG-220

0 1 2 4 Miles

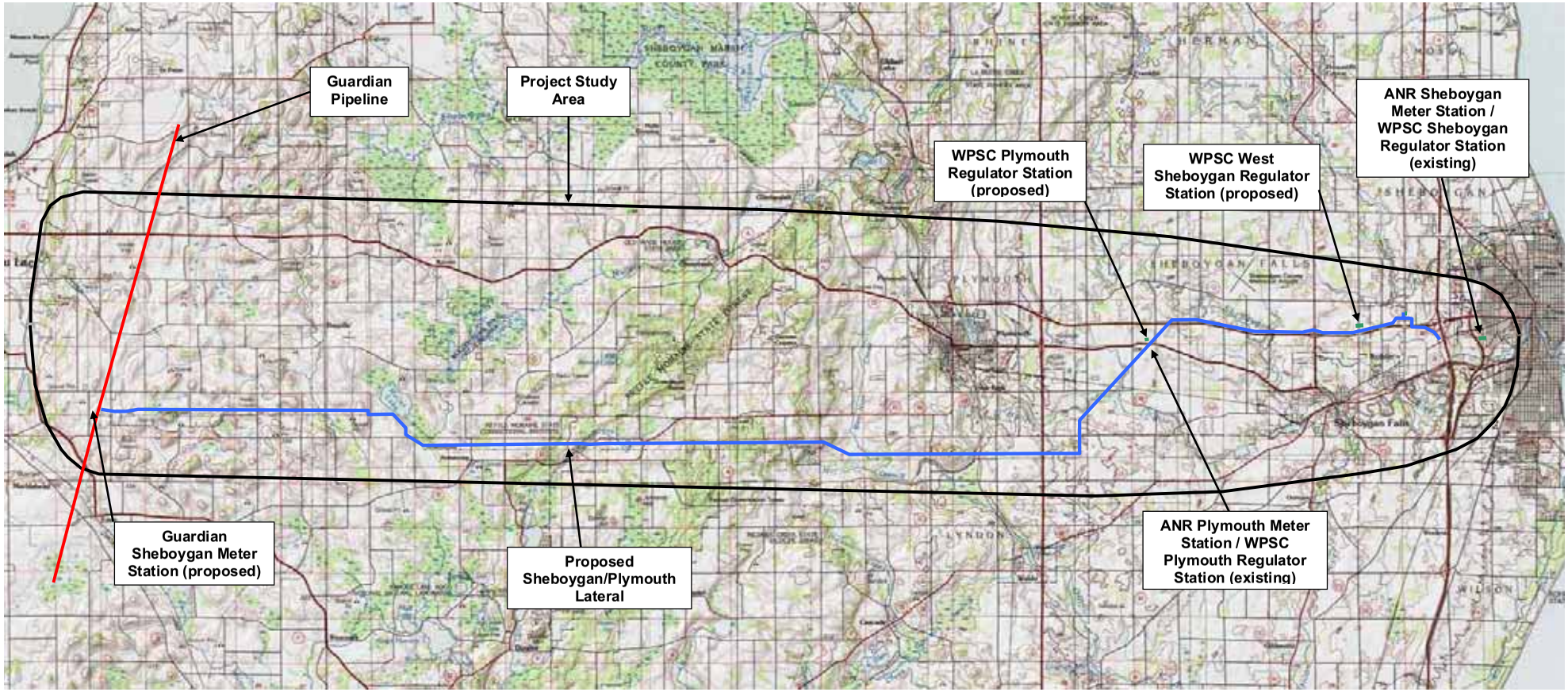
Figure 4 – WG and WEPCO Fox Valley Lateral Route



Wisconsin Gas/WEPCO Proposed Fox Valley Lateral
Docket # 05-CG-03

Figure 5 – WPSC Sheboygan Lateral Route

Figure 12



Source: 2003 TOPO! National Geographic

Not to Scale.

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SHEBOYGAN LATERAL PROJECT AREA

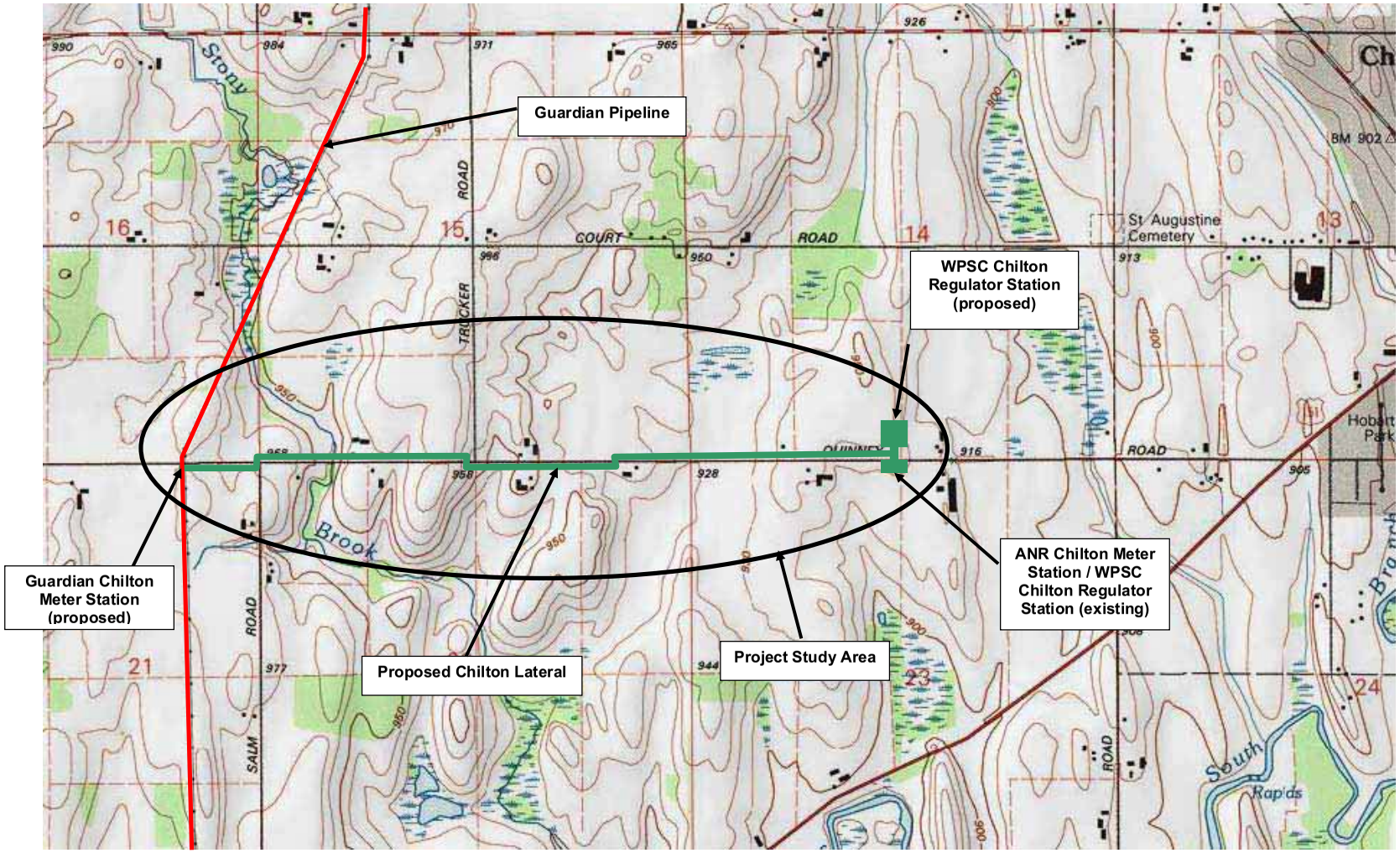
GUARDIAN II LATERALS PROJECT
FOND DU LAC AND SHEBOYGAN COUNTIES, WISCONSIN

OCTOBER 19, 2006

93045

Figure 6 – WPSC Chilton Lateral Route

Figure 25



Source: 2003 TOPO! National Geographic

Not to Scale.

Wisconsin Public Service

CHILTON LATERAL PROJECT AREA

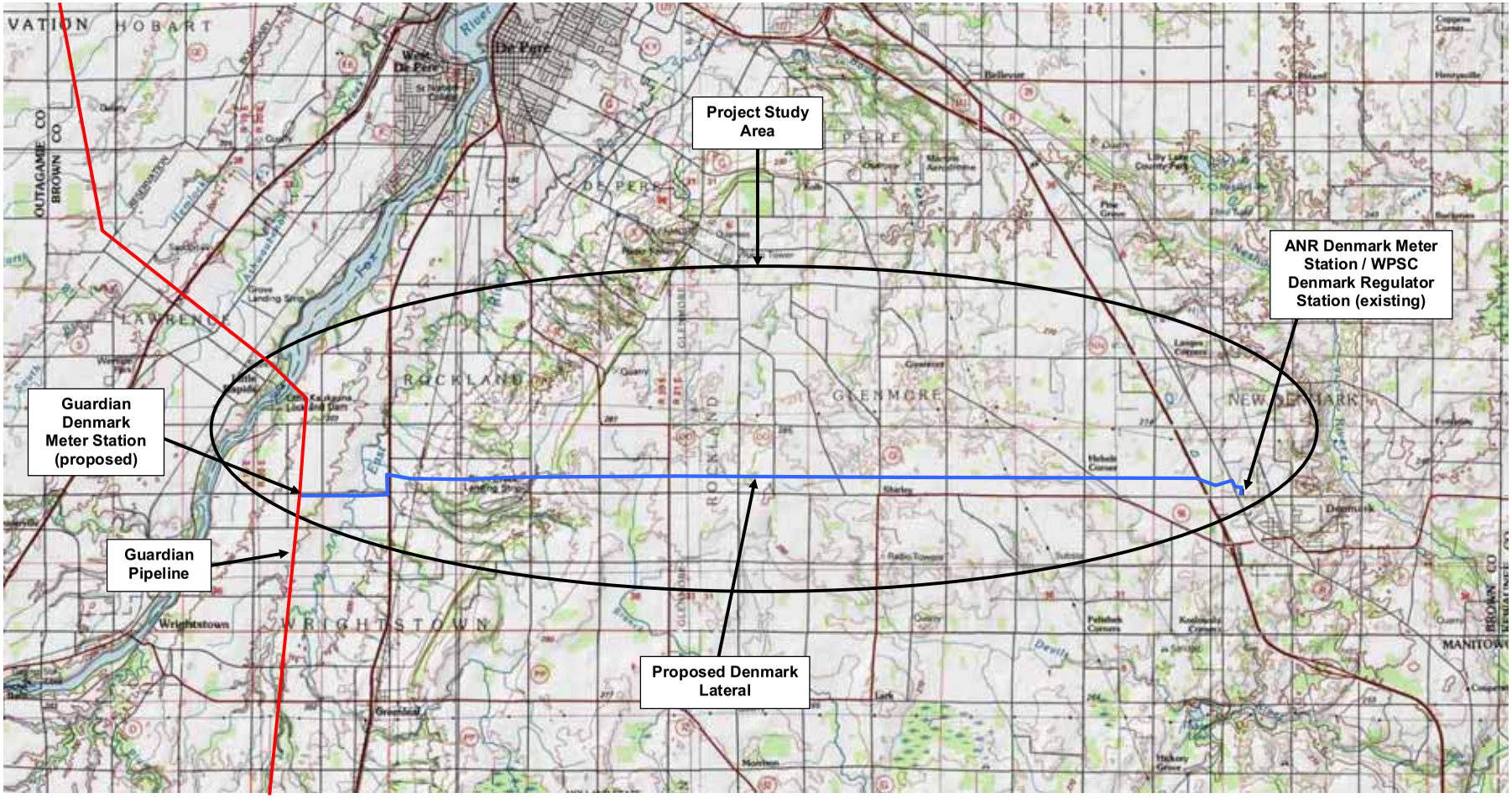
GUARDIAN II LATERALS PROJECT
CALUMET COUNTY, WISCONSIN

OCTOBER 19, 2006

93045

Figure 7 – WPSC Denmark Lateral Route

Figure 33



Source: 2003 TOPO! National Geographic

Not to Scale.

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Wisconsin Public Service

DENMARK LATERAL PROJECT AREA

GUARDIAN II LATERALS PROJECT
BROWN COUNTY, WISCONSIN

OCTOBER 19, 2006

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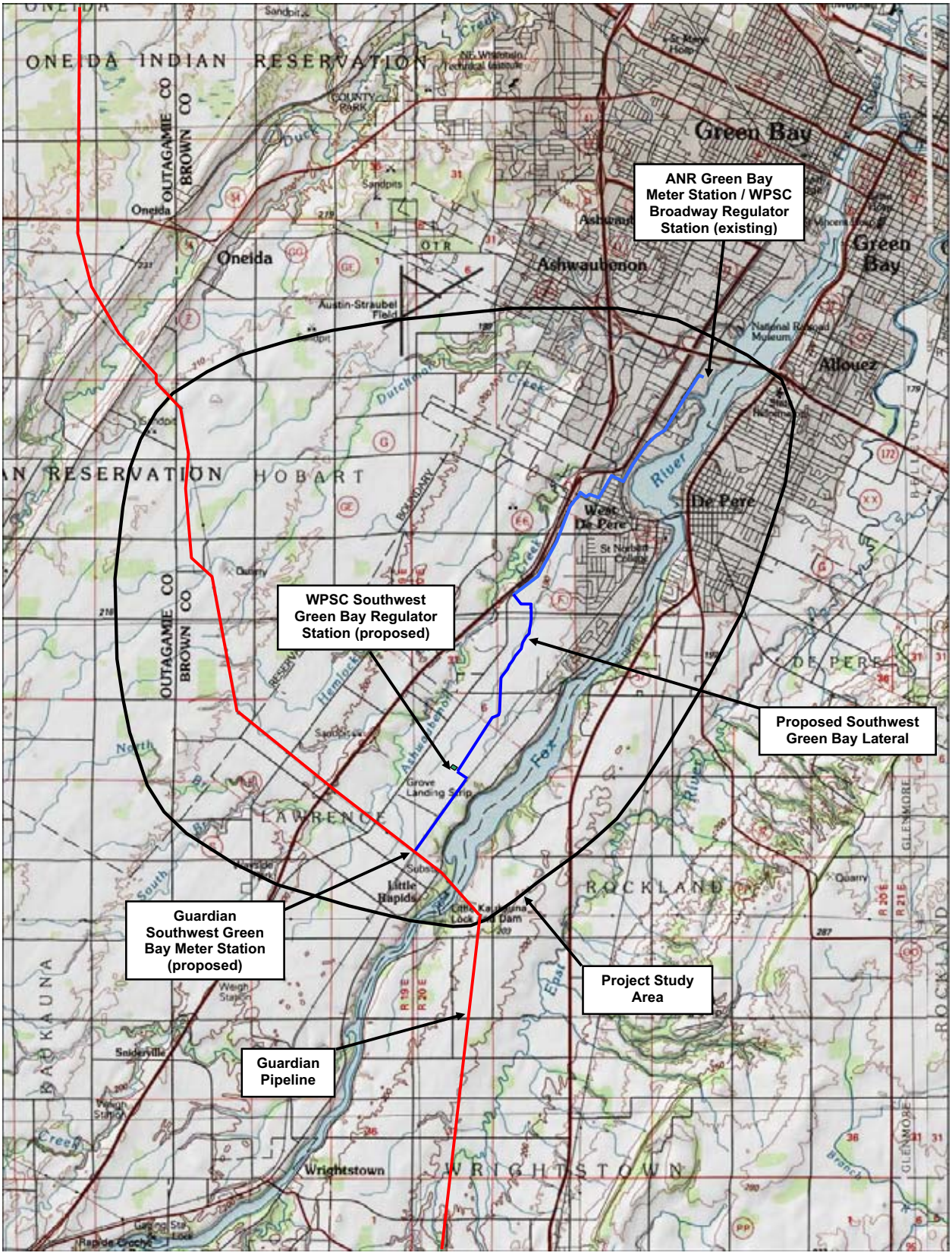
Figure 8 – WPSC Southwest Green Bay Lateral Route



Source: 2003 TOPO! National Geographic

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Wisconsin Public Service

SOUTHWEST GREEN BAY LATERAL PROJECT AREA

GUARDIAN II LATERALS PROJECT
BROWN COUNTY, WISCONSIN

OCTOBER 19, 2006 93045

Figure 40